SMALL BUSINESS INNOVATION DEVELOPMENT ACT

HEARINGS
BEFORE THE
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SCIENCE AND TECHNOLOGY
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SMALL BUSINESS INNOVATION DEVELOPMENT ACT

TUESDAY, JANUARY 26, 1982

House of Representatives,
Committee on Science and Technology,
Washington, D.C.

The committee met, pursuant to call, at 9:30 a.m., in room 2318, Rayburn House Office Building Hon. Don Fuqua (chairman of the committee) presiding.

Mr. Fuqua. The committee will be in order.

We are pleased to welcome our distinguished witnesses today, and also to welcome back the members of this committee as we begin the 2d session of the 97th Congress.

Today we begin our hearings on H.R. 4326, the Small Business Innovation Development Act, which was sequentially referred to the Committee on Science and Technology after it was reported by the Small Business Committee. H.R. 4326 would amend the Small Business Act in an effort to involve small innovative firms in Federal research and development and to utilize Federal research and development as a base for technological innovation.

To achieve these objectives, H.R. 4326 requires all Federal agencies with R. & D. budgets over $100 million to establish small business innovation research programs. The National Science Foundation's Small Business Innovation Research program serves as the model program envisioned for Federal-wide expansion. This committee has closely followed the development of the NSF program, whose successes have captured the interest of many in the Congress.

In addition, the bill requires agencies to set aside 3 percent of their research and development budgets to support the Small Business Innovation Research programs. Following a 4-year phase-in, 13 agencies will support small business innovation research programs at an estimated level of over $1 billion.

There are several reasons underlying my request to the Speaker for sequential referral of this legislation. First, the bill would have a substantial impact on the Federal research and development budget as a whole, suggesting its consideration as a matter of national science policy.

Second, the Science and Technology Committee is the authorizing committee for many of the agencies affected by the legislation; in fact, the decision to retain the bill at the full committee level was based on its relevance to all of our subcommittees.

Third, I was concerned that the set-aside provisions of the bill might cause a disproportionate cut in funds available for basic research.

In addition, over the last several years this committee, through the able leadership of George Brown, Doug Walgren, Al Gore, and others, has embarked on an extensive program in innovation and productivity, a major aspect of which has been the subject of small business innovation. The committee has consistently found that small business is highly innovative and should be encouraged.

In granting the committee sequential referral of H.R. 4326, the Speaker has imposed a time limit for reporting of March 1, 1982. Other authorizing committees referred the bill have the same deadline. It is my hope that we can coordinate our efforts with them and still meet the Speaker's filing date.

I believe we must continue to seek the most effective ways to utilize the innovative potential which exists in our Nation's small high technology firms. I look forward to receiving the testimony of our witnesses to assist us toward that end.

I would now like to recognize the ranking minority member, Mr. Winn, for any comments he would care to make.

Mr. **Winn**. Thank you, Mr. Chairman.

Mr. Chairman, I want to join you in welcoming our distinguished witnesses for today. I look forward to their testimony and comments, as well as the input from our witnesses on the subsequent 2 days of hearings.

Prior to coming to Congress I was a small businessman. I feel I have a good insight into the special problems of the entire small business community. I have consistently supported legislative proposals which will enable small businesses to receive an equitable share of Federal dollars. H.R. 4326, the Small Business Innovation Development Act, will provide small, innovative firms with a strengthening of their role in Federal research and development efforts. I am pleased to be a co-sponsor of this bill.

Mr. Chairman, at the same time, I want to emphasize that I am approaching these hearings with an open mind. My bias is obviously in favor of the bill, but I am anxious to hear comments and suggestions as to how the bill might be improved.

I know that our bill differs from the one passed by the Senate and supported by the President. I know that there are members of the research community who have some legitimate concerns about the bill. I hope we will have an open airing of views during our 3 days of hearings.

We take up this legislation at a particularly difficult time. Throughout the 1960's and 1970's, we operated in a period of ever-expanding Federal budgets for almost every agency. Today our Nation's economy is suffering the effects of that overspending. We are operating in a needed environment of restricted Federal funding in non-mandated areas. This will make any set-aside a difficult proposition. While helping small, high technology business I do not want to harm our science and basic research communities. Both groups must be encouraged and assisted. Neither can be allowed to be harmed.

Mr. Chairman, I congratulate you on calling these hearings. I know they will prove informative on this important subject.

Mr. FUQUA. Thank you, Mr. Winn.

[Opening statements of Mrs. Heckler and Mr. Shamansky follow:]

OPENING STATEMENT BY MARGARET M. HECKLER, SMALL BUSINESS INNOVATION DEVELOPMENT ACT

Thank you, Mr. Chairman.

As a long time supporter of small business, I am very pleased to see this substantial piece of legislation achieve the level of attention it has. The Senate passage of a similar bill (S. 881) on a 90–0 vote is indicative of the need and bipartisan support for good legislation.

Now, the track record for small business is fantastic. They are the greatest source for innovation and job creation. Most people, including members of Congress, are surprised to discover that small businesses comprise 97 percent of all U.S. firms; generate 43 percent of the Gross National Product (GNP); are responsible for 64 percent of wholesaling and 73 percent of retail sales; comprise 76 percent of construction (in dollar volume) and employ 58 percent of the American work force.

In a study of 5.6 million small firms for the Department of Commerce, it was reported that businesses with 20 or fewer employees created 66 percent of all net new jobs in the private sector between 1969–1976. And if you include firms of up to 500 employees, they account for 87 percent of all new jobs. In addition, 80 percent of new jobs were generated by businesses under five years old.

The figures dealing with innovation are even more impressive. The ratio of innovations to R&D employment is four fold larger in businesses with fewer than 1,000 employees than for larger firms. If you compare this group with firms employing over 10,000 people, the rate of innovation is 24 times higher for the smaller business.

I am going over some of these figures only because I want to contrast them to one other figure, namely, the percent of Federal R&D money that is devoted to these most efficient innovators and job creators. That number is disgracefully low, 4 percent. There have been several Federal initiatives to increase this number, but the inbred prejudices in the Federal agencies that divert 96 percent of Federal R&D funds away from small firms has yet to be overcome.

Today begins three days of hearings on the Small Business Committee's bill which they feel best addresses this issue. I for one have a great deal of respect for the members of that committee. I know that John LaFalce and Bill Stanton of the General Oversight Subcommittee have worked very hard on this bill. It merits the best of this committee's attention.

There is no question that I support what this bill is trying to do. We simply owe it to the taxpayers of this country to put more of their R&D tax dollars into the most efficient innovators and job creators around—small business, whether the details of this bill best accomplish that objective is something we hope to conclude from these hearings.

It's no secret that, in general, the scientific community opposes the bill. They are concerned that the basic research funds will be disproportionately cut due to the fact that development funding is largely committed in advance. They also claim that setting aside money for small business runs counter to current public policy of giving research support to the most qualified performer on the basis of open competition. There are, in short, issues on the other side of this coin that this Committee must address.

We do not want to help small business while at the same time threatening the integrity of basic research. The overall welfare of the country is our goal, and it will require a compromise of interests to meet it.

I am looking forward to today's witnesses in assisting us in developing the most appropriate legislative mandate to bring small business into the mainstream.

STATEMENT BY CONGRESSMAN BOB SHAMANSKY

Mr. Chairman, the bill now before this Committee addresses a critical issue. It deals with matters important to this country's maintaining and strengthening its position in innovation and increasing productivity.

With both our trade deficit and unemployment increasing and no end in sight, we must take those initiatives which best address these problems. H.R. 4326 does that.

The contribution innovative small businesses have made are impressive. Innovation is at the core of our economic well-being and is a major force underlying growth and job creation. Absence of technological advance in effect contributes to inflation while its presence permits U.S. goods to compete in domestic and world markets.

The contribution that innovative science and technology-rated firms have made to my own Congressional district will be explored by the Science, Research, and Technology Subcommittee at a February 16 field hearing in Columbus. That hearing will focus on the local conditions which foster the development of hi-tech firms and what measures may be necessary at the federal level to encourage further innovation and small business growth. Targeting federal research and development assistance would be one possibility.

However, I am concerned about the effect a three percent set-aside would have on basic research awards to universities. I encourage our witnesses to address this matter.

My apprehension is heightened when I recall the vigorous fight this Committee had with the administration early last year to restore money for the National Science Foundation. What would be the implications another Administration onslaught against the NSF for fiscal 1983 when coupled with a three percent set-aside which might be taken out of the hide of the universities and research institutions?

We must realize that the universities, which obtain the bulk of their research funds from Federal sources, are most sensitive to any changes in Federal support of research and development.

Mr. Chairman, I applaud the sponsors of H.R. 4326 and S. 881 and hope we can alleviate any possible damage that these bills might cause for universities and basic research institutions.

Mr. FUQUA. To begin our hearings, we have two very distinguished Members of the U.S. Senate, the senior Senator from Massachusetts, Senator Kennedy, and the prime sponsor of the bill in the Senate, Senator Warren Rudman from New Hampshire.

STATEMENT OF HON. EDWARD M. KENNEDY, A U.S. SENATOR FROM THE STATE OF MASSACHUSETTS

Mr. KENNEDY. Thank you very much, Mr. Chairman, and members of the committee. I particularly want to express my appreciation, Mr. Chairman, to you and to the members of the committee for holding these hearings in a timely fashion, at the beginning of this session of Congress. This is a matter that I consider to be of very significant importance, not only to the small business community of the Nation but also to the future research capability of our country.

I want to say what a pleasure it is to be here with the primary sponsor of this legislation, Senator Rudman, who is the chairman of the Senate Small Business Subcommittee on Innovation and Technology and has been the real workhorse in developing this legislation and insuring its successful and unanimous passage in the Senate of the United States.

He has done, I think, an extraordinary job, and all of us who care about the strength of our economy and the role of small business in our economy are in his debt for his leadership in this area.

Mr. Chairman, I know I don't have to delay the committee this morning by pointing out the importance of research and technology. But I would refer you to your own statements in 1979:

> We must take forceful action now to encourage the formation and survival of small new technology firms, otherwise our Nation will be relegated to a secondary position in the world's economic markets.

I think this is a clear statement of the need for this legislation.

Mr. Chairman, small business is the largest business in this country. It is the source of the greatest innovation and creativity, the source of the greatest number of jobs in our economy, and I think is playing an extraordinary role in our economy today. And given the economic challenges we face, whether it is the high interest rates, unemployment, the size of the deficit, there is a very compelling case to be made for strengthening the part of our economy that offers us the most relief and help in our recovery.

This program is needed, Mr. Chairman, and I hope that we can get early action on it. This legislation offers the chance to reverse what has been a very dangerous trend, and that is the failure of developing the research and technological capabilities of our economy, by harnessing the unique ability of the small business sector in the generation of new technology.

As you are aware, less than 4 percent of our Federal R. & D. expenditures go to small business, and yet study after study has indicated that smaller firms are far more efficient producers of innovations than the larger enterprises.

According to the National Science Foundation study done in 1976, small firms produce about 24 times as many innovations per R. & D. dollar as the larger firms. The 1977 study by the Office of Management and Budget concluded the cost for scientists or engineers is twice as much in firms with a thousand employees than in smaller firms. And the leadership of small business innovation and production is complemented by its clear leadership in the production of new jobs.

By channeling a greater share of the Federal R. & D. to smaller innovative companies we can help maximize the benefits of scarce resources. The results of the National Science Foundation Small Business Innovation Research program, which you referred to in your opening statement, Mr. Chairman, has provided ample evidence of the contributions small business can make in our economy. I have seen it in a very dramatic way in my own State of Massachusetts.

Mr. Chairman, I am proud to have introduced the legislation in 1975 which resulted in the NSF program for set aside of R. & D. dollars for small businesses. Now we have an opportunity to broaden this program to involve all major agencies of the Federal Government, new opportunities for small innovative companies will be created and finally we will begin to take advantage of the extraordinary creativity and ingenuity embodied in those firms.

This bill is not the whole answer to our lagging rate of innovation, nor is it the whole answer to our economic ills, but it is an important step. We can strengthen our role in world commerce with this bill, and I would hope we can get early acceptance of it.

I will make one final and brief comment. I am aware of the concerns raised by members of the university community about aspects of this legislation, particularly with regard to the possible impact in NIH.

I believe the interests of the small business scientists and university scientists can be accommodated without doing violence to the peer review system.We have seen that process worked out in the National Science Foundation successfully, and that peer review system has been effective.

Some important questions will be raised and that I think they need to be addressed. How will the peer review process at NIH be affected by this legislation? How many firms are engaged in or will become engaged in the basic biomedical research of the kind supported by NIH? And how can we assure that scientists who work for small businesses have a full opportunity to compete for the basic biomedical research dollars? These are difficult questions which need the attention of this committee and other committees, but this controversy cannot be used to derail this piece of legislation altogether.

This is a fundamentally sound piece of legislation, and I hope the House will act on it this session.

STATEMENT OF HON. WARREN RUDMAN, A U.S. SENATOR FROM THE STATE OF NEW HAMPSHIRE

Senator RUDMAN. Mr. Chairman, thank you very much. It is a pleasure for me and, in fact, is my first occasion, to testify before a House committee during my freshman term in the Senate. It is a particular pleasure to appear before my Congressman, Judd Gregg, who represents my congressional district.

Mr. FUQUA. A very valuable member of our committee, and we are glad to have him.

Senator RUDMAN. I thank you very much for giving us an opportunity to appear. As you know numerous studies indicate that our country's ability to continue its position of preeminence in technology development is going to depend largely, as it has in the past, on the small businessman and the inventor. Unfortunately, during the 1960's and 1970's three factors have combined to threaten our preeminence in the field of technology development.

First, big business turned its back on uncertain technology or unproven new products in favor of existing markets and products to insure short-term profit. Second, equity capital available to small, high-risk companies for initial concept development has decreased. And third, the small business community has been frozen out of the Federal research and development procurement process by policies which discriminate in favor of large companies and large universities. The results have been predictable and, for those of us faced with the task of reestablishing a vital economy, very disheartening. The growth rate of the U.S. productivity has fallen sharply since 1973 and now lags far behind levels in Western Europe and Japan. Further, the United States has dropped to dead last among industrialized nations in the rate of investment in new productivity increasing equipment and machinery.

Few dispute that the slowdown has been a key factor in the decline of many U.S. industries, including automobiles, steel and, in particular, consumer electronics. This decline has been accompanied by a corresponding increase in dependence on imported products, imports which take an estimated 2.6 million jobs a year from U.S. producers and seriously affect our trade balance.

All that I have said so far is well documented, and I am sure you are generally familiar with the facts. However I want to commend to this committee, and in fact to every Member of the Congress, the first in a series of articles that appeared recently in the Washington Post entitled "Playing It Safe and Losing Out." I request that it appear in the record today, because that article by Peter Behr contains observations on this problem and many others in this area which have been enumerated by many of America's most respected businessmen, both large and small.

[The article follows:]

The Washington Post

SUNDAY, JANUARY 17, 1982

Playing It Safe, and Losing Out

By Peter Behr
Washington Post Staff Writer

One of the most respected business leaders in the United States over the past decade was Reginald H. Jones, who ran General Electric for nine years until his retirement last April.

For years, he spoke for business in Washington as head of its primary lobbying group, the Business Council, but now his words are directed more toward business. His departing message in a series of speeches and interviews contains a stiff criticism of executives for their part in the battering American business has taken in the past decade.

Hundreds of companies are in serious trouble, and many basic industries are in decline because of competition from overseas. Their plight has exposed a basic weakness in the way these companies were run over the past few decades, according to Jones and other business leaders and analysts. The critics say American management has been shortsighted, going for short-term benefits instead of long-term gains.

AMERICAN MANAGEMENT

PART 1

"Too many corporate managers let their companies get "fat and sloppy" in the glow of the business boom during the 1950s and early 1960s, hanging on to old products and manufacturing processes that crumbled before an invasion of foreign competition in the 1970s, Jones says.

There were many reasons for the decline, he adds, such as the world's economic turmoil and tax policies and governmental regulations that seemed to place firms at a disadvantage against foreign competitors. But the leaders of America's business and financial communities must shoulder part of the blame, he says.

"Any businessman looking for alibis for his company's failings

See MANAGE, A12, Col. 1

Playing It Safe on the Bottom Line—and Paying the Price Later

MANAGE, From A1

has not had any trouble finding them," Jones says. "But that is cold comfort for a company that finds its markets taken over by more imaginative and aggressive competitors.

"The evidence is that our foreign competitors are moving quickly to adopt the new technologies that will dominate the factories and offices of tomorrow," Jones said in a speech shortly before his retirement. And he warned that companies that try to make do with old ways "are in for big trouble in the 1980s."

The driving force throughout most of business in the past two decades was a push for immediate profits, an allegiance to short-term success that too often obscured the necessity of building for the future, these critics say.

The battle plan in much of business during the '60s and '70s was play it safe; take the shortest, surest route to instant profits; avoid risks and sacrifice investments in uncertain technology or unproven new products if they threaten achievement of the goals at hand.

Before he joined the Reagan administration as Commerce Department secretary, Malcolm Baldrige ran Scovill Inc., a Connecticut-based manufacturer of household and automotive products that has had its own battles with foreign competition. "While we were resting on our laurels, companies abroad were taking the long-term risks" and making commitments for the future, Baldrige said. "We were beginning to believe we would never lose. We did not develop new management techniques and got off on this ridiculous kick of trying to increase earnings each quarter.

"We played it safe," Baldrige said.

"Most large companies create a corporate bureaucracy that avoids risks wherever possible," William C. Norris, chairman of Control Data Corp., told a House subcommittee hearing in 1979. "The emphasis today is on immediate payoffs [and] in this environment, development of new products and services takes a back seat," he said. Innovation by small, technology-oriented firms—which traditionally work on the frontiers of change—slowed significantly during this period, he added.

"One of the problems in the United States, with government and business, is the very short-term, expedient approach to problems—this quarter's earnings, this year's budget: 'Get me through the next election or the next board meeting,' " said Bendix Corp. Chairman William Agee in an interview.

"We need a much greater concern for the future," he said.

"The fingers need to be pointed inward," said William J. Abernathy, professor of business administration at the Harvard Business School. "We got complacent, lazy and went to sleep" in the '60s and '70s, he said.

"By their preference for serving existing markets rather than creating new ones and by their devotion to short-term returns and 'management by the numbers,' many [American business managers] have effectively forsworn long-term technological superiority as a competitive weapon," Abernathy and Robert Hayes, a colleague at Harvard Business School, said. That was a fatal mistake at a time when overnight changes in electronics was revolutionizing production processes and consumer products, they add.

"There was more attention given to short-run than longer-term strategies," and that put pressure on company managers to produce profits and sustain them, said William Bowen, head of the management search firm Heidrick and Struggles in Chicago.

This criticism has become widely accepted by the business community. Of nearly 1,000 top executives surveyed this year by Bowen's firm, 76 percent said there has been a damaging overemphasis on immediate financial goals.

The Damage

There is also general agreement about the damage that this short-term philosophy has done to industrial research and technology, to creativity and innovation, to risk-taking and competitiveness, and to basic industrial processes that determine the quality of the things business makes:

- The growth rate of U.S. productivity—a basic measure of the efficiency of manufacturers—has fallen sharply since 1973 and lags far behind levels in Europe and Japan.
- Research investments by both government and industry grew rapidly in the '50s and early '60s, but remained essentially unchanged after 1966 when inflation is taken into account.
- The nature of industrial research changed as companies moved away from basic research on scientific frontiers toward applied research and development work on immediate problems. A survey of 100 leading firms in 1979 by economist Edwin Mansfield showed that the proportion of company-financed basic research dropped by one-fourth between 1967 and 1977, to-

REGINALD H. JONES
... "we were pretty cocky"

gether with a shift away from relative risky projects.

- The United States has dropped to dead last among industrialized nations in the rate of investment in new, productivity-improving machinery, compared with the gross national product.

"There can be little doubt that the creative pulse of the country is slowing down," Burton Malkiel, chairman of Princeton University's economics department, concluded as the 1970s drew to a close.

The slowdown has been a key factor in the decline of many basic industries. Autos, steel, textile machinery, electronics, footwear and tire industries all suffered tremendously from a surge of imports since the '60s. Imports take an estimated 2.6 million jobs a year from U.S. producers, according to the congressional Joint Economic Committee.

The list of targets in the sights of foreign competitors continues to grow, among them computers for businesses and homes, semiconductors, telecommunications equipment, household appliances, jet engines, commercial aircraft, electric motors, lawnmowers, chain saws, industrial robots, air compressors and the barely imaginable products of genetic research.

"The Japanese have in many cases simply taken our products and processed them more efficiently than we," said Agee. "But 80 percent of the electronics patents in the last five years have been issued to Japanese companies, so they're getting ready [to compete] with products as well as processes. We should be very worried," he added.

The Pressures

The debate is not over the problem, but over its roots. And the issue is whether this short-term drive for profits and the cautious, close-to-the-vest strategies of the past decade were unavoidable.

One who thinks so is Alan Greenspan, chairman of President Ford's Council of Economic Advisers and a member of several corporate boards of directors. When inflation broke loose in the late '60s, triggered by the costs of the Vietnam war, everything changed for American business, said Greenspan. Inflation created a tremendous pressure on corporate executives to concentrate on short-lived investments with quick cash payoffs because that was the best insurance against future surges of unexpected inflation that could ruin the value of long-range investments.

"Who's to blame? Should American managers have behaved as if there was no risk?" Greenspan asked. Some companies did, he added, and went belly-up in the process.

"I agree there has been timidity and a lack of foresight. That reflects on all of us. Foresight is available in relatively small doses. Timidity? It might not have been a bad idea," said Greenspan.

Some other observers, though, contend that these outside pressures coincided with a fundamental shift in the behavior of top management in the United States, a change in the "attitudes, preoccupations and practices of American managers," according to Abernathy and Hayes at the Harvard Business School.

They have become leading prophets of the "American business malaise," contending in articles that basic flaws in the training and performance of American managers are to blame for much of the erosion of the nation's competitive edge. Their July, 1980, article in the Harvard Business Review entitled "Managing Our Way to Economic Decline" has gone through more than 23,000 reprints.

As they see it, the industrial boom that began with the end of World War II created a sudden shortage of experienced managers, and the business schools filled the vacuum. The model for success became the hard-charging business-school whiz who could apply management theory to any situation as he climbed the ladder through a succession of short-term stints in different positions. Abernathy and Hayes call this manager a "pseudo-professional"—who lacked expertise in specific manufacturing or technological skills, but who seemed to have an all-purpose background in management.

These managers reached the top rungs in the '60s, and by mid-decade the economy was feeling the twin shocks of escalating inflation and a surge of import competition from the rebuilt industries of Japan and Europe. The new, uncertain environment that followed seemed to demand the new breed of financial and administrative experts over those with "hands-on" experience in production or technology, Abernathy and Hayes said.

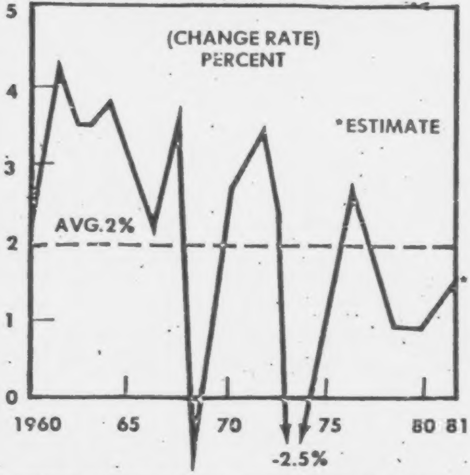
A study by Golightly & Co. in 1980 reported that company chairmen and presidents with financial and legal backgrounds increased 50 percent over the past 25 years, and, according to Hayes and Abernathy, this shift in training created a managerial outlook ill-suited to bold ventures with new products or costly modernization of plants to gain a leg up on competitors.

The Mergers

In many large companies, the competitive juices flowed in another direction, giving rise to the free-wheeling acquisition of smaller companies in unrelated businesses, in the hope that losses in one area would be offset by gains in another. Business schools encouraged this approach to risk management and the merger trend helped the rise of executives with legal and financial backgrounds, rather than engineering or research, for example. "Those with financial training found it a lot easier to move along the acquisition route," said Jones.

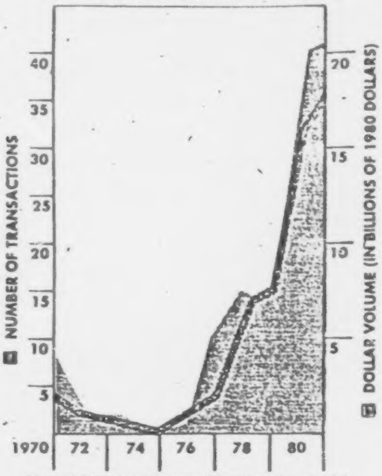
The merger trend, which has grown virtually unchecked since the end of World War II, also fit in with a common sociological view of post-

ANNUAL U.S. PRODUCTIVITY INCREASE/DECREASE



SOURCE: AMERICAN PRODUCTIVITY CENTER, McKINSEY

MERGERS AND ACQUISITIONS OVER $200 MILLION, COMPLETED TRANSACTIONS



SOURCE: MERGERS AND ACQUISITIONS: THE JOURNAL OF CORPORATE VENTURE

war Americans—an impatient people on the move, dismissing their roots and eager for instant success.

"Mergers are obviously an exciting game; they tend to produce fairly quick and decisive results, and they offer the kind of public recognition that helps careers along," Abernathy and Hayes said.

Critics of the merger wave say, however, that it has distracted attention of top business leaders from both long-term challenges and the daily struggle for quality. Norris of Control Data concludes that "many forced takeovers originate in managerial ambitions, and few serve the long-run interests of the stockholders of the acquiring company."

In many established industries, mergers became a substitute to long-term commitments to technological progress—the approach that foreign competitors would follow in catching and surpassing U.S. firms, Hayes and Abernathy said. Too many business managers failed to see that success in the '70s and '80s would depend on the ability to find new products, create new markets and provide superior quality, the two Harvard professors said. "Guided by what they took to be the newest and best principles of management, American managers have increasingly directed their attention elsewhere."

"It is this new managerial gospel," they add, "that has played a major role in undermining the vigor of American industry."

There were many other new pressures on corporate leaders in the past two decades that distracted them from attention to long-range needs—pressures that most managers hadn't been trained to handle, said Jones. "We had to learn to grasp the significance of new social responsibilities," Jones said. Civil rights and equal opportunity hiring, lobbying, public relations and corporate ethics were new, troubling issues for business in that period.

But the greatest error was in ignoring foreign competition in the '50s and '60s, Jones said. The American market was so large and so strong that many managers never looked beyond it. And when that economy got into trouble, companies didn't look hard enough for new business outside the United States.

"We were pretty cocky . . . we assumed that American producers were the best and the others were imitators, and poor ones at that.

"We found out that wasn't true," Jones said. That insight has come too late for some companies challenged by foreign competitors. For most others, he said, it can be the shock that wakes up American business management.

The second article in this four-part series will appear Tuesday in the Business & Finance section.

Senator **Rudman**. When one considers that and the additional fact that small businesses account for 55 percent of all new jobs in this country, it is amazing to me that the concept that is embodied in your bill and in S. 881 has faced any serious opposition. At a time when Federal resources are scarce, it is of the utmost importance to distribute those resources in a manner that insures the greatest return.

It is uncontrovertible under a whole line of studies that small businesses and independent entrepreneurs are the most efficient users of R. & D. dollars. In fact, very few who have argued in opposition have done so, in my view, on a rational basis.

What I would like to do, Mr. Chairman, in the balance of 3 or 4 minutes, is to address the major opposition you will hear to this bill and our experience with that testimony during our hearings.

The first to oppose a concept of mandated programs were some of the Federal agencies. I am going to be very interested to see what happens in this committee, because the President, of course, does support this legislation. It will be curious to see whether or not these agencies that appear before you speak with the same voice and I shall be interested to hear what their testimony is.

It doesn't surprise me that some bureaucrats at our hearings would pay lipservice to the concept while arguing against any mandatory programs. To look at their argument in the most favorable light, one might characterize it as follows: numerous mandated programs detract from Government efficiency and restrict the latitude of talented managers to respond across a wide spectrum of agency needs. At first blush the argument seems eminently reasonable. However, it fails to take into account the total nature of our Federal Government; first, to manage governmental programs in the most efficient and economical manner and, second, of course, to address recognized societal needs.

Even if the agencies' arguments can be justified with respect to the first goal, and I seriously doubt that they can, they cannot be justified with respect to the second. Society needs increased small business involvement in the Federal R. & D. procurement process, and traditional contract award methods have failed to secure that goal.

It isn't enough for Congress to sit and listen to bureaucrats commending the goals which are addressed in this bill. Two years ago while Congress was considering similar legislation, a representative of the Department of Energy testified that he was so impressed by that program that he was going to establish a voluntary program within the Department of Energy. To no one's surprise, at our hearings last year, we found that no such program was ever established.

I recognize that such a program may cause administrative headaches in one form or another. However, I put the following question to your committee: If the Defense Department, which is burdened with as many fragmented programs as anyone might want to consider, a typical bureaucratic nightmare, were satisfied they were getting the biggest bang for the buck, why then did they establish a voluntary SBIR program? The answer is inescapable and cries out for congressionally mandated programs.

The university community opposes this legislation although I seriously question, Mr. Chairman, how many of the universities themselves in this country who are not recipients of major Federal R. & D. grants have actually been polled with respect to this particular issue. University opposition is to me very unreasoned, and I hesitate to use the word, but I am somewhat appalled to listen to the kind of opposition that we have had from this community which I respect and find to be one of the most enlightened sectors of our entire society.

They don't put it in perspective, and I would like to do that for you here today. Johns Hopkins University, a highly respected institution, that has produced great research in this country, received $300 million in 1979 in Federal R. & D. funds. Mr. Chairman, that is a sum equal to the entire amount under this set-aside for small business innovators and entrepreneurs in the first year of our S. 881 program. Thus, I believe that we have to say reluctantly there is some vested interest in the opposition to this by the university community.

There arguments are two, and you will hear these arguments. First, that the establishment of a mandatory set-aside in and of itself admits the inability of small businesses to compete qualitatively and thus the establishment of this program will result in marginal products at best. Second, basic research in this country will be destroyed because funding for these programs will be taken only from basic research budgets as compared to applied research budgets.

My response to the university community is direct. They have absolutely no empirical data to support either contention, especially the first. Indeed the only evidence that exists concerning the first contention, the National Science Foundation program indicates that a set-aside program will result in high quality projects.

The inability of small businesses to compete with large businesses and large universities for Federal grants is related to the "old boy" network and to cash flow problems only. It has nothing whatsoever to do with quality, and I believe that after hearing evidence before your committee you will be able to reject that argument.

The second concern that relates to basic research is easily addressed through legislation before the committee or by congressional oversight. The companion measure in the Senate, S. 881, now provides that only a pro rata portion of SBIR funding may be taken from basic research budgets. That amendment, the so-called Schmitt amendment, was passed and is now part of our legislation.

It provides also that GAO make a study 2 years from enactment to see what the effect has been on basic research. Still, the universities insist further that small businesses cannot do basic research. Again, where is the proof? Senator John Glenn of Ohio, certainly a friend of the basic research community, recognizes the fact, and he said on the record "Smaller firms are capable of doing basic research that meets the highest standard of quality."

Since I see you will be hearing from a representative of the Association of American Medical Colleges, I would like you to consider the following statement by Dr. Ronald Lamont-Havers, director of R. & D. at the Massachusetts General Hospital, who testified before my subcommittee in Boston as a representative of that association. He said:

> What I would be concerned about in saying that would be that the funds that are set aside, protected funds would prevent one of our investigators from being supported. That is all I am concerned about. I am not really concerned about whether or not there is funding, I am concerned about protecting my own investigators with regard to their funding.

I thought that was a remarkably candid and frank statement, which I think is the genesis of the opposition from that particular association. If the American Association of Medical Colleges is not really concerned about whether or not there is funding, I leave it to you to determine whether the true concern is quality. Indeed like all groups, the university system itself is not free from waste, abuse, and self-interest. We are led to believe that academic involvement guarantees integrity and economy. I believe it does in most cases but not all.

I also want to conclude by telling you that you are going to hear from the American Electronics Association. They will come before you and say they represent small business interests, that 72 percent of their membership companies are small. What will not be volunteered is that makeup of the association's controlling committee is hardly small. The Governmental Affairs Committee is composed of, for instance, Data General, Tectronic, Lockheed, General Radio, Hewlett-Packard, Digital, and a number of others. The Government Procurement Committee is made up of Xerox, Lockheed, Litton Systems, John Fluke Co., and so forth.

My quick perusal of their executive ruling committees reveals that, of the 23 companies listed, 16 are on the New York Stock Exchange, 2 on the American Exchange, and 1 is traded over the counter. Thus any statement by their representative that they represent a cross section of small business in America, in my view, Mr. Chairman, is misleading at the very best.

In conclusion, Senator Kennedy and I are here because we feel the concept embodied in the legislation before this committee is important and in the best interests of the country. One might argue about the level of funding and I, frankly have to tell you that I believe the House version is too high, but none can deny the mandated program will meet a recognized need.

Thank you very much for the opportunity of appearing before you. And if I may answer questions, I will be delighted.

[The prepared statement of Senator Rudman follows:]

TESTIMONY FOR HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

By Senator Warren B. Rudman

Mr. Chairman, I would like to begin by thanking you and the other members of the Committee on Science and Technology for allowing me to appear before you today as you hear testimony regarding House Bill 4326, the Small Business Innovation Development Act. As numerous studies indicate, our country's ability to continue in its position of preeminence in technology development will depend, as it has in the past, on the efforts of small businessmen and independent inventors. Unfortunately, during the sixties and seventies three factors combined to threaten our preeminence in the field of technology development:

1. Big business turned its back on uncertain technology or unproven new products in favor of existing markets and products to insure short-term profits;

2. Equity capital available to small, high risk companies for initial concept development decreased; and

3. The small business community was frozen out of the federal research and development procurement process by policies which discriminate in favor of large companies and universities. The results have been predictable and, to those of us faced with the task of reestablishing a vital economy, disheartening. The growth rate of U.S. productivity has fallen sharply since 1973 and now lags far behind levels in western Europe and Japan. Further, the United States has dropped to dead last among industrialized nations in the rate of investment in new, productivity-improving machinery. Few dispute that the slow down has been a

key factor in the decline of many U.S. industries, including auto, steel, and electronics. This decline has been accompanied by a corresponding increase in dependence on imported products, imports which take an estimated 2.6 million jobs a year from U.S. producers and seriously affect our trade balances. All that I have said so far is well documented, and I am sure that you are all generally familiar with these facts. However, I do commend to your reading the first in a series of articles which appeared in the Washington Post entitled "Playing It Safe And Losing Out." I would also request that it appear in your hearing record as if presented today. The article is by Peter Behr and contains observations on the problems that I have enumerated by many of America's most respected businessmen.

When one considers the above, and the additional fact that small businesses account for 55 percent of all new job creation in this country, it is amazing to me that a concept such as that embodied in H.R.4326 should face any serious and rational opposition. In a time when federal resources are of necessity scarce, it is of the utmost importance to distribute those resources in a manner that insures the greatest return. Since it is uncontroverted fact that small businesses and independent entreprenuers are the most efficient users of research and development dollars, how can anyone argue in opposition to the concept. And, in fact, very few have argued in opposition, and those not on a rational basis. I would like to take the balance of my time to address some of the opposition arguments which I expect that you will hear during the coming three days.

The first to oppose a concept of a mandated program were certain of the federal agencies. It did not surprise me that bureaucrats would pay lip service to the concept while arguing against any mandatory program. To look at their argument in the most favorable light, one might characterize it as follows: numerous mandated programs detract from government efficiency and restrict the latitude of talented managers to respond across a wide spectrum of agency needs. At first blush, the argument seems eminently reasonable. However, it fails to take into account the dual nature of the federal government: (1) to manage governmental programs in the most efficient and economical manner; and (2) to respond to recognized societal needs. Even if the agency's arguments can be justified with respect to the first goal, they most certainly cannot be justified with respect to the second goal. Society needs increased small business involvement in the federal R&D procurement process and traditional contract awards methods have failed to secure that goal. It is not enough for Congress to sit and listen to bureaucrats commending the goals which are addressed in the bill. Two years ago, while Congress was considering similar legislation, a representative of the Department of Energy testified that he was so impressed by the program that he would establish a voluntary program within the Department of Energy. No such program was established. I recognize that such a program may cause administrative headaches of one form or another, but I put the following question to you: If the Defense Department, which is burdened with as many fragmented programs as any one might want to consider in a typical bureaucratic nightmare, was satisfied that it was attaining the biggest bang for the buck, why did it establish a voluntary SBIR program? The answer is inescapable, and cries out for a Congressionally mandated program.

The university community also opposes this legislation, although I question how many of the universities in this country who are not recipients of major federal grants have actually been polled with respect to the issue. The university opposition is so unreasoned and such an example of self interest that I am appalled to listen over and over again to their strident calls. First, let's put this in perspective. John Hopkins University received about $300 million in FY 1979 in federal R&D grants, a sum equal to the total amount that would be included in an SBIR program government-wide if the formula used is based on one percent of extramural R&D conducted by the five major agencies. Thus, vested interest is established at the outset.

The universities use the following arguments to attempt to discredit the concept embodied in the bill:

1. The establishment of a mandatory set-aside in and of itself admits the inability of small business to compete qualitatively and thus the establishment of an SBIR program will result in marginal product at best; and

2. Basic research in this country will be destroyed because funding for SBIR programs will be taken from only basic research budgets.

My response to the university community is direct: they have absolutely no empirical data to support either contention, especially the first. Indeed, the only evidence that exists concerning the first contention, the National Science Foundation SBIR program, indicates that a set-aside program will result in high quality projects. The inability of small business to compete with large businesses and universities for federal grants is related to the "old boy" network and cash flow problems only; it has nothing whatsoever to do with quality. For academics who supposedly are so concerned with empirical proof of ideas to continue to advance this argument is appalling.

The second concern, that relating to basic research, is easily addressed, either through the legislation before your Committee or by Congressional oversight. The companion measure in the Senate, S.881, now provides that only a pro rata portion of SBIR funding may be taken from basic research budgets. It also provides for a GAO study two years from enactment to determine the effect on basic research. And yet, the universities insist further that small business cannot do basic research. Again, where is the proof. Senator John Glenn, certainly a friend of the basic research community, recognizes that fact and has said, on the record, that he believes "smaller firms are capable of doing basic research that meets the highest standards of quality."

Since I see that you will be hearing from a representative of the Association of American Medical Colleges, I would like you to consider the following statement by Dr. Ronald Lamont-Havers, Director of Research of the Massachusetts General Hospital, who testified before my Subcommittee as a representative of that Association. His words were as follows:

> What I would be concerned about, in saying that, would be the fact that funds are then set aside, protected funds, which prevent one of our own investigators not being supported. That's all I'm concerned about. I'm not really concerned about protecting my own investigators as far as their funding, and any reduction in funds within that system is going to have a perturbation within our system.

If the Association of American Medical Colleges is not really "concerned about whether or not there's funding," I leave it to you to decide whether or not the true concern is for quality or for basic research.

Indeed, like all groups, the university system is not free from waste, abuse, or self interest, although we are led to believe that academic involvement guarantees integrity and economy.

I also note that you will hear from the American Electronics Association. That Association will also testify against your concept. The Association wrote to me claiming to be representative of small business interests inasmuch as 72 percent of the member companies are small. However, what was not volunteered was the make up of the Association's controlling committees. The Governmental Affairs Committee is composed of the following corporations: Data General, MA Communications, Rolm, Textronic, Lockheed, General Radio, Computron, Hewlett Packard, Digital, and Sanders Associates. The Government Procurement Committee is comprised of representatives from Xerox; Fuller Glickman, Mousalam and Barton; Textronic; Lockheed; Fenwick, Stone, Davis and West; Argo Systems; Litton Industries; The John Fluke Company; Rolm, Watkins Johnson; SRI International; Varian Associates; and Interstate Electronics. My quick perusal of last Thursday's stock quotations indicates that out of the 23 companies listed, 16 are traded on the New York Stock Exchange, 2 on the American Stock Exchange, and one traded over the counter. Thus, any statement by representatives of the American Electronics Association to the effect that they represent a cross section of the small business community is misleading at best. The Association represents and is controlled by major corporate interests.

In conclusion, Senator Kennedy and I are here because we feel the concept embodied in the legislation before your Committee is extremely important and in the best interests of the country. One might argue about the amount of funding, and I do feel the House version is too high, but none can deny that the mandated program will meet a well recognized need. Thank you for your time and your attention. I would be pleased to answer any questions you might have.

Mr. **FUQUA**. Thank you very much for a detailed statement. I know of your interest and concern in this matter.

Senator **KENNEDY**. Mr. Chairman, I would welcome the chance to respond to one or two questions. We have a meeting of the Joint Economic Committee, of which I am a member, and where Mr. Volcker is appearing before us today. My colleague Senator Rudman, is gifted and knowledgeable about this legislation. I will be glad to take one or two questions and then let my colleague speak.

Mr. **FUQUA**. Then I will address this to you, Senator Kennedy. It has been suggested to phase in the SBIR program with targets but not mandated figures. Would this be a better approach to this legislation? I would be interested in your comments.

Senator **KENNEDY**. I would agree with Senator Rudman. I agree the Senate provisions, which represent a phased-in program to the 1-percent level, this seems to me to be a reasonable way to proceed. It does establish increasing commitments up to the 1 percent which I think most of us agree is a modest level. It will give a chance for the committees, as this legislation is phased in, to review how the agencies are responding to it.

Mr. **FUQUA**. How would you address the problem of basic research versus applied research?

Senator **KENNEDY**. I mentioned this subject earlier in my opening statement. The issue on the basic research involves the peer review system, which has served NIH well, and which is important in biomedical research.

Now as I understand the concerns of the biomedical community, they believe that the peer review system shouldn't be altered in considering various proposals. I have been the chairman of the Health Committee and I feel the peer review system has functioned, and has functioned effectively.

We also have a peer review system in the NSF, and I think it has been extremely effective. This committee should review the NSF system and learn from it.

It is interesting that the administration has altered the regulations to permit for-profit companies to be involved in applying for research grants at NIH. This is an important step.

In this Nation's interests we should not exclude them from being involved in the frontiers of science. I think that applies not only in the applied area but also to the basic research area.

Mr. FUQUA. Mr. Winn?

Mr. WINN. Thank you very much, Mr. Chairman.

I would just like to have Senator Kennedy's comments about whether he thinks the 3-percent set-aside in the House bill is realistic and based on your experience on this issue or do you think possibly a smaller figure might be more appropriate.

Senator KENNEDY. I think the feeling that Senator Rudman and I have, and I think it grew out of the hearings is that the Senate version is preferable. It does reach a modest level of 1 percent. It is a stepped-up program which will permit the oversight committees to have a chance to review its implementation over a period of years.

This legislation seems to provide a responsible response to the needs that we are facing in this country—by bringing in, in a significant way, the creative and innovative abilities of the small business community in R. & D.

Mr. FUQUA. Senator, thank you for joining us this morning.

Are there questions of Senator Rudman?

Senator RUDMAN. Mr. Chairman, I would like to respond to that same question.

I think one of the dangers that we run in any mandated program of any kind is a danger that the money is too high and cannot be absorbed efficiently. If it cannot be absorbed efficiently, it is spent wastefully and then the program is highly criticized as being unsuccessful and typical of so many.

We feel after doing a fair amount of research, the number we came up with and how we stepped it up is not accidental. We have gone over the entire Federal research budget in the major agencies, and we have come to the conclusion this can be absorbed, particularly under a simplified peer review system such as the National Science Foundation program and that the first year we could probably absorb about what we have put in here up to the 1 percent.

I want to point out to you, sir, that we certainly have the option in our bill to spend more. An agency is allowed to spend more, even after that third year but they cannot spend less.

Mr. WINN. That leads me into another question, if I might, Mr. Chairman, about Senator Schmitt's amendment, which puts a cap of 1 percent on basic research. And I notice in your floor debate on S. 881 that you said in fact his amendment strengthens the bill.

I am wondering in my own mind, would you support a similar amendment to the House bill. I understand that is possible.

Senator RUDMAN. Absolutely. We tried to get the university community to join with us in this legislation. Senator Schmitt, a former astronaut, and Senator Glenn, with great contacts within that community came to me and said:

> Look, this is the problem. What they are concerned about is that there will be a disproportionate share of the 1 percent, or half a percent, taken from that basic research budget. They would rather spend it on applied research because applied research usually produces results that are visible and viable very quickly. So that was a reasonable argument.

We said: "Look, let's make sure no more than 1 percent can come from basic research." Because unquestionably basic research is the seed that essentially makes applied research prosper, so I would certainly support such an amendment in your bill.

Mr. WINN. Let me talk about another subject, Senator Rudman, that your committee considered. Would you support an amendment to the House bill to exclude intramural research from the set-aside?

Senator RUDMAN. We essentially have done that.

Mr. WINN. So you support that point?

Senator RUDMAN. Yes. It would be very unfair to apply the 1 percent to the whole, for instance, broad spectrum of the Defense Department, when a large percentage of that money was already being spent by people employed by the Defense Department. That would now put a disproportionate share, more than 1 percent, set-aside out of their general extra-mural budget which was let. That is correct.

Mr. WINN. Do you agree with Senator Kennedy that you are going to start with—in the Senate bill you started with the 1 percent and you could in a 3-year period of time look at the possibility of moving up to 2 or 3 percent?

Senator RUDMAN. We start at less than 1 percent. We work up to 1 percent. What we tried to do is to anticipate the problem that we would have from some parts of the academic community and to try to reassure them, and I think all we did was exacerbate the problem. At any rate, ours moves up very slowly.

I would not want to see a mandated program, frankly, go much beyond that because what we have done is, we have researched a number of companies in this country that could absorb this kind of money, and we think the $300 to $500 million annually that would be here for seed money would be adequate.

Here is an interesting statistic. In the life sciences field, talking about NIH, we found to our amazement that there are 2,600 companies, private companies, that are doing basic research or are capable of basic research in those fields. And the other interesting fact is that most of them have a tie with the academic community. They are working in concert with a college or a laboratory within a university, so a great deal of this money will find its way back into the university community as it is in the basic research area.

Mr. WINN. Thank you very much.

With your background and experience in this field you make a very convincing witness. Thank you for appearing today, Senator.

Senator RUDMAN. I appreciate being here.

Mr. FUQUA. Mr. Winn? Mr. Gore?

Mr. GORE. Thank you, Mr. Chairman. I will be very brief.

I wanted to say for the record that the Investigations and Oversight Subcommittee had two full days of hearings on the underlying problem that your bill seeks to address, Senator, and we found that the SBIR program at NSF is, as other observers have noted frequently, an unqualified success. It has really been one of those programs of which we can be quite proud.

I intend to offer amendments to H.R. 4326 to conform that in many respects to the bill that you are sponsoring in the Senate, to have a phase-in period leading up to a 1-percent cap rather than a 3-percent cap, to carefully define the funds to which the 1 percent applies, and to limit the amount of basic research money affected to a strict 1 percent.

I also believe that the responsibility for the program might better be vested in the Office of Federal Procurement. I believe they have a little better expertise in this area. Also I hope to offer amendments requiring periodic reports on the progress of this program.

I take it I would have no problem with the amendments that I have briefly referred to.

Senator RUDMAN. I would not. I believe we did make a change in where it is located. We took that out of the SBA jurisdiction. We now have that under that agency and actually under the Science Adviser's Office in the White House. We did not think the SBA had the proper technical expertise for oversight. I agree with those amendments completely.

Here is an example of something that has worked. It has universal support and I am sure down in Tennessee they feel as we do in New Hampshire: If something works, keep using it, and that is what we are trying to do.

Mr. GORE. I think I would have to agree with your statements. I appreciate your appearance here today.

Thank you, Mr. Chairman.

Mr. FUQUA. Mr. Gregg?

Mr. GREGG. Thank you, Mr. Chairman.

It is certainly a pleasure to have before this committee my Senator from New Hampshire. Senator Rudman has excelled as a Member of the Senate even though he has only been in the Senate for a brief time. This bill is an example of the excellence he has brought to the Senate in my opinion. I am very supportive of the bill in the form it went through the Senate and think we can certainly come to agreement between the Senate and House sides.

You noted in your introductory statement that the President had supported the bill. I would like to introduce for the record a letter from the President supporting the bill which was addressed to the Senator.

Mr. FUQUA. Which bill is the President supporting?

Senator RUDMAN. The Senate bill.

Mr. FUQUA. S. 881?

Senator RUDMAN. Yes.

Mr. FUQUA. Without objection the letter will be made a part of the record.

[The letter follows:]

THE WHITE HOUSE
WASHINGTON

October 6, 1981

Dear Warren:

I would like to express my support for S.881, the Small Business Innovation Research Act.

Your concern that small firms be able to participate equitably in Federal research and development is shared by this Administration. In the long run, all sectors of the economy are likely to benefit from the increased competition and research incentives your legislation would provide.

I congratulate you for the leadership you have shown in advancing the interests of those small businesses which are the job-producing lifeblood of our economy.

Sincerely,

Ronald Reagan

The Honorable Warren Rudman
United States Senate
Washington, D. C. 20510

Mr. GREGG. There seems to be four areas where there is disagreement. There is the dollar area, the percentage area, and the set-aside, whether there should be a set-aside. I wish you could just list this once again why a set-aside is important versus just a directive.

Senator RUDMAN. The general experience in testimony before our committee, and I am sure before committees here, has been that equal treatment under the law for small businesses is inherently unequal. They are unable to compete against the major corporations, against the major universities for grants of this nature.

The reason they are unable to compete is that they just do not have the expertise to deal with the bureaucracy that exists in the area of Federal grants. We have all heard the word "grantsmanship," and you know I was just amazed at the number of people involved in some of these research community areas, hospitals and the academic community, involved only in being here in Washington seeking these grants.

The small businessman who has a Ph. D. in physics who runs a little company up in Wilton, N.H., who has an idea on how to fractionate new oil to make it 20 percent more efficient needs $100,000 to build a working model, and the physicists think it is a good idea, and he doesn't know how to get the money. He has never been able to get it. The National Science Foundation experience has indicated that if he had the money he could do something with it.

What we have finally done is said there are exceptions to rules. We say the only way to leverage the innovative side of our economy is to mandate some of the money going to those people who can leverage it in the most effective way. I think that is the best answer I can give you on that subject.

Mr. GREGG. I would agree entirely with that point. The third area that seems to be in disagreement between the two bills is protection of the basic research area. Certainly the Senate language and the language presented by Congressman Gore would clear that up.

The third area you have discussed much is this whole area of how the small business set-aside would work as far as universities are concerned. I noted in the Senate report I believe it was that there was language which reflected that preference would be given to small businesses which work with universities, is that correct?

Senator RUDMAN. That is correct, because in the basic research area, in particular the testimony before our committee, each of the witnesses who testified, that were involved for instance in the National Science Foundation program, in many sophisticated areas were in fact out of the academic community and still maintaining ties with cooperative efforts with MIT, Harvard, or the University of New Hampshire, among those who testified before us, and I think that will continue.

I would say to my Congressman and my friend from New Hampshire, the legitimate concern of the academic community that has been expressed has been the one which says, "Look, maybe the 1 percent isn't so bad, but how do we know if it doesn't work well it might not be 20 percent by the year 1985." There are two answers to that. Answer one is we will have to work to make sure that doesn't happen. And No. 2 is if it is that successful, maybe it ought to happen.

Mr. **Gregg**. There is a GAO accounting process under the Senate bill which I notice Congressman Gore is going to introduce as a possible amendment which would seem to take up the issue of whether the program works or doesn't work. We will know that as a result of that audit I would assume also from the way the program works.

Senator **Rudman**. That was Senator Glenn's amendment. He talked to me about it and I thought it was a good idea that we ought to have an amendment agreed to that at the end of the 2-year period we assess what the impact has been on basic research and if it has been a deleterious effect, we come back and do something about it.

Mr. **Gregg**. Again I congratulate the Senate on bringing this bill forward and feel we can certainly reach agreement. At least I hope we can reach agreement on those points.

Mr. **Fuqua**. Thank you, Mr. Gregg.

Mr. Dunn.

Mr. **Dunn**. Thank you, Mr. Chairman.

I have a couple concerns. I guess my concerns stem from not the science background but other areas I have looked at with set-aside. I have been in construction for 20 years and set-asides have been a fiasco. My own State of Michigan is about as bad as it can get.

I have been with GAO and the Department of Defense with their set-aside programs for high unemployment areas where, again, it is a fiasco and it is not working. I don't know that your program would work any better. It is not that I object to the idea but I don't know why it would work any better. That is question No. 1.

Question No. 2, in reviewing my own grants, dispersals from our own office and the various agencies listed here, small business and individuals have, at least in my opinion, probably more than 1 percent right now.

Senator **Rudman**. In procurement, but not in research and not in innovation programs like SBIR. Let me take up the questions in the order in which you have presented them. You are absolutely right about set-asides generally. They have been a disaster in many cases. They have resulted in wasted money.

In addition, however, we have had a program that we have watched in the Congress over the years, Senator Kennedy having a major part in developing in that national science program and the work, the work under a process very carefully followed. There is a peer review system. Bureaucrats themselves don't decide at NSF who gets that money. Panels of people from industry and the university community decide whether or not the idea is sound.

What we have done in the Senate bill and what I hope the House bill will eventually reflect is that we track that same system. So where money is given to small businesses on an achievement basis—incidentally, in small amounts—be given to those people who are worthy of it.

Second, you will find most of those small business awards are not in the area of innovation and technology but they are in something else.

Mr. **Dunn**. Are you saying then, these grants really do total up to less than 1 percent of the Federal Reserve dollars in small business?

Senator **Rudman**. Small business isn't getting anywhere close to 1 percent in terms of innovation and technology grants in SBIR programs.

Mr. **Dunn**. Those are my questions. Thank you.

Senator **Rudman**. Thank you.

Mr. **Brown** [presiding]. Senator, I am going to recognize myself, since I am the next one on this list I have here.

As you know, this committee has had a long-standing interest in the subject matter that your bill addresses and I want to commend you for the perspicacity you have shown in that legislation and for your ability to get the support of the administration.

I think one of the questions that some of the unhappy Democrats are going to ask is, "Why, when other programs aimed at the support of science and technology, basic research and so forth are being cut, including the NSF, you have been so fortunate in getting the support of the administration for what is essentially a new initiative, a very desirable initiative I might say, in this area, and speaking specifically of legislation, like the Stevenson-Wydler Act passed last year, which has been zeroed out in the budget by this administration?"

Could you offer some comments as to how we might be able to begin to see eye to eye with the administration on what is desirable and what isn't desirable in this area?

Senator **Rudman**. I think it is an awful lot like food you get in different restaurants; it depends on how it is presented which determines how good it tastes.

Let me say to you that I received a good deal of opposition from OMB on this originally. They opposed it. At our original hearings, the agencies opposed it. I took some numbers and put some numbers together which led to one inescapable conclusion:

The only way to leverage this economy, which is in such deplorable condition today, is to leverage it with ideas that create jobs. Thirty years ago today, we didn't have an electronic industry in this country in the area of consumer electronics, one of the largest industries in our country, something that came to basic research from applied research.

I, frankly, went to the President and said:

> Look, we are talking about economic recovery. We are not talking about more Federal dollars. We are talking about taking Federal dollars already being spent and let's use them to leverage small business, which in the last 10 years has created 80 percent of the new jobs in this country.

There has been a net decline in employment in the Fortune 500 companies. Well, I think when you talk about leveraging employment with Federal R. & D. money, that starts to make some sense, and I believe that is why this finally got the support of the President.

I will tell you frankly, it was not easy, because we had a lot of opposition in the administration who philosophically were against set-asides, as Mr. Brown pointed out, and with good reason. But I suggest any time you can connect expenditure of R. & D. funds and the creation of new jobs, I think you might get a more sympathetic ear.

Mr. **Brown**. We are going to want to follow your guidance very closely on that——

Senator **Rudman**. I wish you good luck.

Mr. **Brown** [continuing]. To see how we can do this more effectively. As far as I personally am concerned, I share completely in the philosophy that you have expressed, and we are looking for effective ways to do it, but it gets into a philosophical discussion of whether, first, the Federal role should involve special set-asides for groups like this, whether it even has a role in stimulating the private enterprise sector to accomplish national goals such as improved productivity, through innovation and so forth, and their question of how you answer that question depends upon the kinds of programs that we would be able to structure.

Do you have any figures as to what the administrative cost of this program is likely to be?

Senator **Rudman**. I believe we do. They are in our hearing record. May I supply those for the record?

Mr. **Brown**. Certainly.

[The information follows:]

CBO COST ESTIMATE (FROM S. REPT. 197-194)

5. Cost estimate: Although S. 881 specifically states that no appropriation of funds is authorized by this bill, nonetheless, certain costs, which are shown in the following table, will be incurred by federal agencies in order to implement the bill.

	Millions
Estimated authorization level:	
Fiscal year:	
1982	$6
1983	11
1984	18
1985	20
1986	21
Estimated outlays:	
Fiscal year:	
1982	3
1983	9
1984	17
1985	19
1986	20

Portions of the cost of this bill would fall within nearly all the budget functions.

Mr. **Brown**. With regard to the item such as the existing National Science Foundation small business innovation research program, we have had difficulty getting any increase in funding for that program. Under your bill it will move up slightly, and we certainly are happy about that.

Senator **Rudman**. Yes, it will move.

Mr. **Brown**. Would you feel there might be other innovative efforts to secure the kind of benefits that your legislation would provide? Do you think there are other initiatives that we might take and some of which might even require funding, which this administration might be willing to support?

Senator **Rudman**. Mr. Chairman, I really can't answer that question other than to say I am convinced that based on simply projecting the dollars spent over at NSF—and I agree with you that program has been cut severely and should not have been, and I voted against that cut in the Appropriations Committee, but let me simply say that I believe one of the best ways to prove to this administration or any other that science technology innovation can lead to real employment is through this kind of a program, to finally give that sector of the American economy the kind of help from the Government that has been neglected so very, very long, and I think we will have a way to do that.

Mr. BROWN. There have been relatively few Members in either the House or the Senate who sense the importance of this in the way that you have expressed it, and we need to increase that number. I hope that we can work with you in trying to develop that understanding of the significance of basic research, longe-range research in terms of curing the fundamental ill of this economy.

Senator RUDMAN. I would be honored to work with you, Mr. Chairman. I think it is a vital area to which we must devote more and more time.

Mr. BROWN. Mr. Wolpe.

Mr. WOLPE. Thank you, Mr. Chairman.

As a cosponsor of the House version of this legislation, I obviously share your enthusiasm for this initiative. I just have one question. I want to pursue just for a moment the subject that came up in Senator Kennedy's testimony with respect to the academic community's concern about the continuity of the quality of work that would be performed in the basic research area, and there was some discussion of the peer review system.

It is my understanding that the Senate version of this legislation, your version, talks about peer review as being appropriate in a generalized sense, that the House version of legislation has a specific requirement of peer review in phase II of the procedure. Would you comment on the differences and how you think it could be resolved.

Senator RUDMAN. It is probably more in style than form. I will look at the House bill again, but it is our intention to track the National Science Foundation program, which is essentially a peer review program.

Mr. WOLPE. Thank you very much.

Senator RUDMAN. We have those administrative costs right now. I will give them now, rather than supply for the record later: $3 million in fiscal year 1982; $9 million in 1983; $17 million in 1984; $19 million in 1985; and $20 million in 1986, governmentwide.

Mr. BROWN. I point out that is comparable and perhaps a little more than the cost of the Stevenson-Wydler Act.

Mr. Lundine.

Mr. LUNDINE. I wonder if it would be better to take the NSF program, which everyone acknowledges has been a success, and increase the funding of that program by a commensurate dollar amount with modest reductions in all the others, rather than to require a set-aside in each particular agency when some of them—I realize their testimony may change before this committee, but as I understand they testified in the Senate that it would complicate the mission of those agencies to have a set-aside.

Senator RUDMAN. That was considered, and I think the reason it was rejected is because it is very difficult for people at the National Science Foundation, without a change in character of that particular operation and that section of it, to really have a good handle on what the Defense Department needs in the area of basic and applied research—the various other large agencies, NASA and so forth.

We believe this program, as it is set forth in the Senate bill, can be easily administered. I think those costs I just cited to your chairman would indicate that. We believe too much centralization could decrease quality rather than increase it.

We think, for instance, that a group within the Defense Department would know full well in the area of laser technology what it really was looking for in terms of a weapons system for the 1990's, and that a physicist running a small science company in some part of this country, with a high degree of expertise in laser technology, might be able to use a research award of $100,000 highly effectively.

That is something NSF might not know in that case. We thought diversification would enhance the opportunity of success rather than concentrating it, which we thought might decrease it.

Mr. **Brown**. Mrs. Heckler.

Mrs. **Heckler**. Thank you, Mr. Chairman.

Senator, I would like to congratulate you on a very fine bill and also on absolutely superb leadership. I think it is nothing short of a miracle that you got the White House to support this when there is such total resistance to new ideas, and in view of the fact a set-aside program has been frowned upon in virtually every agency.

Of course, coming from New England as we do, we understand the value of small business perhaps in a way that is not as apparent in societies and economies where there isn't as much dependence on small business initiative.

In the House there is tremendous support for the bill passed by the small business community of the House. They are convinced their 3-percent figure is realistic. Why would you disagree with them?

Senator **Rudman**. I disagree because of a matter of absorption. It is something like the defense budget. I sit on the Defense Appropriations Committee. We talk about increase of *x* number of dollars. You look at where those dollars are going, you look at the industrial base upon which they are going to be applied, and you say: Can we absorb them efficiently?

I do not believe in the next 3 years the small business high technology community could absorb that kind of money efficiently. In order for the money to be used efficiently, it should be relatively scarce, it should be hard to get, it should only go to the most noteworthy of projects if we are going to have a track record that will enable us to come back in a few years and say, "It worked and now let's improve it."

I think we would be far better off with the Senate version, which steps up to 1 percent. If we find that is inadequate and we are producing a great many new jobs and new innovations, fine, we can change it later. It would be a mistake to do it first. It could in fact ruin the program.

Mrs. **Heckler**. There are those very adamantly opposed to the bill and while their voice seems not to have been reflected in the Senate vote, nonetheless we have heard some very serious and thoughtful criticisms of the bill, especially from the scientific community. How is it that you are so convinced that their assumptions and their point of view are not necessarily realistic?

Senator **Rudman**. Well, in this country, in the last 10 years in particular, there has been a very interesting development in terms of people from the academic community leaving the community on a full-time basis and starting small high-technology companies. In fact, the district you represent in the Commonwealth of Massachusetts is probably more typical of that phenomena because of the academic institutions located contiguous to it.

In my State of New Hampshire the same thing has happened.

Now, these people are in a unique position to leverage these dollars with low overhead into some very interesting ideas of innovation and technology. They are the same people that wore academic titles. They are now entrepreneurs believing in free enterprise to develop these systems. Even in the basic areas of genetics and life sciences, and we believe they ought to be given some opportunity to participate in this program.

Recently, NIH is allowing for-profit organizations to compete in this area, but some of the regulations that have been promulgated pursuant to that deregulation may make it very difficult for them to compete freely.

We believe that this mandated program is so small that it would have no serious effect on the academic community. I truly believe that their concern is one of the future, not of the present, and I share that concern and I have said to them that I will work to make sure their concern does not become a reality, but this has not been enough. So I guess we will have to try harder.

Mrs. **Heckler**. I think the fact that the Senate has gone so far and the bill has gone so far is testimony to, I think, the strength of small business and to your leadership and to the basic scene of inequity that has been recognized by many for years, over the issue of small business.

I think the complication comes from the cutbacks in the whole field of scientific research which have been so deep, and deeper than I think was desirable. So it seems that at a time when resources are dwindling, now they have to deal with a new problem of funds tied up in projects that will not be fruitful and deny them the minimum that will allow them to carry on their research. That seems to be their objection.

Senator **Rudman**. Those are legitimate concerns. The track record across the whole community of R. & D. has not always been stellar. I do not say that critically. R. & D. is a very difficult area. You can come up with ideas and plans and spend money and it will not come to any fruition. That is what basic research is all about.

But if you are interested, in the GAO report prepared 18 months ago on the efficacy of the use of some of the money that went into R. & D. in the academic community, it would make for some very interesting reading, and I really feel that in terms of use, we have got a track record in the small business community of producing ideas and inventions, technology and jobs that is very meritorious and certainly equal to that of the academic community.

Mrs. **Heckler**. I certainly would agree with you, Senator, and as a matter of fact I think the record would show that all of us in our public speeches talk about the rate of innovation, the job creation attributable to small business breakthroughs, so that I think the application of that track record to this field is, in my view, appropriate, but should be done carefully. I really appreciate your testimony today.

Senator **Rudman**. Thank you.

Mr. **Fuqua**. Mr. Shamansky.

Mr. **Shamansky**. I have no questions, Mr. Chairman.

Mr. **Fuqua**. Mr. Walker.

Mr. **Walker**. Thank you very much, Mr. Chairman.

Senator Rudman, I think it is important that small business be able to compete for Federal R. & D. dollars. I would like to raise a couple of questions about the concept of competition in all of this.

Is it your contention the reason why small business hasn't competed successfully in the past for Federal R. & D. dollars because primarily Federal agencies overlook small business and the innovation that they are able to produce?

Senator **Rudman**. In the area of innovation and technology, basic and applied research, it is a very difficult structure to deal with. If you are a fellow running a very small high-tech company with an idea on plasma research—something I am personally familiar with—he doesn't know how to get to these Federal dollars.

The bureaucrats, very rightfully so, administering these programs are very hesitant sometimes to invest in ideas of these small entrepreneurs because they in many cases believe they will not produce results.

Well, that is also true with the major business community and with the academic community, except if you make a mistake with Exxon you could say, "Well, it was a normal mistake because if their research didn't prove it, probably nobody could."

Make that same mistake with a small fellow in New Hampshire, then you probably in the eyes of your superior made a bad choice. That is really one of the problems.

Mr. **Walker**. How about the problem that most small businesses are having problems competing for contracts because, for instance, when they compete with the university community they are competing against people who are tax subsidized, pay no taxes, and so on, and the small businessman himself is in business and so therefore is paying taxes and has some cost that don't accrue to the university community. Is that a problem?

Senator **Rudman**. I don't know if that is a problem. The small business community perhaps does not have the staff to go forth and present grants in any kind of a manner that is susccessful. That is the problem.

Mr. **Walker**. Even if they did, they would have the cost of things like taxes, being a basic one, that the university community doesn't have to pay in most instances.

Senator **Rudman**. Many of the small businessmen I have known over the last 2 years have had little problem with taxes. It could be a problem.

Mr. **Walker**. I am looking at it from the competitive standpoint and I guess my point is if you take the set-aside route and you are setting aside basically funds which are already in existence that are in someone else's pocket, isn't it possible that the set-aside will end up getting us less research because the costs, where we are going with the set-aside are such that it is going to cost them more money to do the same kind of research?

Senator **Rudman**. As a matter of fact, I can now say I know where you are going, and that is totally not so. The leveraging of R. & D. by small business in this country is anywhere from three to five times more effective than that done by major corporations and by large universities.

Large universities and major corporations have enormous administrative and research overhead that the small companies don't have. If you are interested, our Senate hearings in Boston and here in Washington developed some very interesting data in that particular area.

The fact of the matter is that the small companies leveraged this far more effectively than any other part of the economy.

Mr. **Walker**. I think it is important to have that on the record because I think one of the things which is of concern to the university community in particular is the fact that the dollars that are going to be used in the set-aside, whether it is a 1-percent set-aside or 3-percent set-aside, it will come directly out of their hides, and I think what we need is some assurance, if that is the case, we are actually going to get far more research for those dollars than we are presently getting.

And it seems to me that the crux of the argument is how much research are we going to get for our Federal dollars and statistics of the type you cite I think are very important in this to show that in fact we are going to get more research for the limited dollars that we have to spend than we are presently able to get.

Senator **Rudman**. Well, also I believe we will get research that will turn itself into jobs much more rapidly than what we are doing now, and that is what we need in this country today, the creation of new industries, new products, and new jobs. So far we haven't found a way to do that.

Mr. **Walker**. Thank you, Mr. Chairman.

Mr. **Fuqua**. Thank you, Mr. Walker. Mr. McGrath.

Mr. **McGrath**. Thank you, Mr. Chairman.

Welcome, Senator. I hadn't intended to ask you any questions but you piqued my curiosity when you answered my colleague from New York's question regarding decentralization versus centralization, and then you and a question regarding a $3 million administration fee. I am just wondering how many agencies in the Federal Government, or subagencies, are going to be spilling Federal money into small business research.

Senator **Rudman**. I can give you that number. We have that. Those agencies with R. & D. budgets of above $100 million, I believe that is our figure.

In our bill, the top five agencies, because they have the greatest amount of money, we felt. Research funds reserved from the smaller agencies would begin to be counterproductive.

Mr. **Fuqua**. Mr. White.

Mr. **White**. Thank you, Mr. Chairman.

Senator, the Department of Defense has had an ongoing program on small business set-aside and they haven't had too happy a result with this.

In fact, in many instances some small businesses have bid on contracts when they themselves did not have the capability, and maybe there was a competing bid which had the capability but lost because of the lowness of the set-aside.

Then the low bidder turned right around, or the small business set-aside turned right around, and contracted to have the other chap who had the capability to do the job. I see nothing in this bill that would prevent that.

Senator RUDMAN. What you are describing, of course I am very familiar with. The so-called Loeb-Julie case, which was on "60 Minutes" a few weeks ago, is a typical example of that. It has been quite a scandal as to what happened to that company and how procurement went from small business set-asides to large companies with label changes.

That is in procurement and I think the procurement area of set-asides is a very different area than what we are talking about here. We are talking about research and development, and research and development has a much broader base of people who can do this kind of work than small businesses can in set-asides.

Mr. WHITE. Would it not be well in the legislation to insure that the successful bidder had the full competency within that company to perform the research and development for which they were bidding, to prevent precisely what "60 Minutes" was depicting?

Senator RUDMAN. What we have done in our bill to insure that—and I would be willing to see any reasonable change—is to set up a program of review for award of these grants by people who, in our view, would be highly qualified to decide which of these entrepreneurs, which of these inventors ought to receive a grant.

Mr. WHITE. Would it not be safer to define who will be eligible to receive those bids by their having the capability within themselves to perform the project bid upon?

Senator RUDMAN. I would say to you I would have to think about that one. I would want to make sure if we had a definition it would be a definition that could not be used to exclude some that might otherwise be qualified, but certainly the concept you are talking about I cannot disagree with.

Mr. WHITE. We have experienced this in the Armed Services Committee. I thought rather than open the door to more views and greater mediocrity, we ought to have some assurance in this bill.

Mr. FUQUA. Senator, thank you very much for taking your time and answering the questions. I know about your dedication and support for this bill. We appreciate very much your contributions here today.

Senator RUDMAN. It has been a pleasure to be here before your committee and to have this exchange. Thank you very much.

Mr. FUQUA. Thank you very much.

We are running somewhat behind. We have six more witnesses. Perhaps I could ask the witnesses to summarize their statements and maybe the members could abbreviate their questions.

However, I know many members have questions about this and I hope we can expedite the proceedings. We will call the next two witnesses, Denis Prager, Assistant Director for the Office of Science and Technology Policy, and he will be followed by Mr. Donald Templeman, the Deputy Administrator of the Small Business Administration.

If you have a prepared statement, we will be happy to receive it. If you want to summarize, we will be happy to hear you.

STATEMENTS OF DENIS PRAGER, ASSISTANT DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY; AND DONALD TEMPLEMAN, DEPUTY ADMINISTRATOR, SMALL BUSINESS ADMINISTRATION

Mr. **Prager**. I will do that.

Mr. Chairman, I am Denis J. Prager, Assistant Director of the White House Office of Science and Technology Policy. As such, I am pleased to have this opportunity to present to the committee the administration's views on H.R. 4326, "The Small Business Innovation Development Act of 1981."

This bill is founded on the premise that increased innovation by small business is a key element in efforts to strengthen the American economy by enhancing the efficiency and productivty of our industrial sector.

This legislation proposes to further the goal of increased small business innovation through direct Government spending arising out of Federal research and development—R. & D.—funds set aside by participating Federal R. & D. agencies for the support of a specific Small Business Innovation Research [SBIR] program.

Mr. Chairman, the administration heartily supports the worthy goal of this legislation. It is clear that small businesses are, by their very nature, inventive and innovative and that facilitating invention and innovation among small firms is an important aspect of our collective efforts to strengthen industrial America.

For these reasons, the administration supported passage by the Senate of S. 881, "The Small Business Innovation Research Act of 1981."

A letter from President Reagan to Senator Rudman indicating that support has been submitted above for the record.

The administration continues to support S. 881. That bill, as passed by the Senate, is carefully drawn to stimulate increased Federal support of small business innovation while assuring that the funding required for that support does not come inordinately at the expense of Federal agency intramural research or extramural basic research conducted primarily by our colleges and universities.

The required set-aside of 1 percent, achieved in the third year of program operation, is sufficient to permit the major Federal R. & D. agencies to assess the effectiveness of the SBIR program in the context of their missions and operational modes. Provision for GAO evaluation of the program is also designed to assess the program's effectiveness and the nature of its impacts on the funding agencies.

Mr. Chairman, the bill before us today, H.R. 4326, is intended to achieve the same objectives as its Senate counterpart, S. 881. However, because the House bill departs in several significant ways from the Senate bill passed last November, the administration must oppose its enactment.

We find H.R. 4326 to be too expansive, mandating excessive set-asides and the involvement of too many agencies, and to lack the safeguards we believe are needed to assure the continuity and integrity of Federal agency intramural research and development and extramural basic science programs.

Each of the agency representatives testifying will address, in some detail, those provisions of H.R. 4326 which we specifically oppose. Let me set the stage for their comments by summarizing the administration's concerns.

PROGRAM SIZE

H.R. 4326 would require that agencies with fiscal year 1982 R. & D. budgets in excess of $100 million establish SBIR programs and set-aside funds for their support. To date, the SBIR program is still experimental, having been tried only in two agencies—NSF and DOD—and only for a relatively short time.

We do not believe it appropriate suddenly to expand this program to a dozen or more agencies without longer-term experience with a smaller number of programs. We prefer the approach taken by S. 881 which uses a formula and minimum funding base to determine which agencies must establish an SBIR program, limiting its expansion to a total of five agencies—DOD, HHS, DOE, NSF, and NASA. We recommend that H.R. 4326 be amended to include this same approach.

LEVEL OF SUPPORT

H.R. 4326 would require, after a 3-year phase-in period, that 3 percent of the R. & D. budget of each Federal agency with an R. & D. budget in excess of $100 million be set aside for support of the agency's SBIR program. The Congressional Budget Office estimates that this would result in a total Federal SBIR program of $1.67 billion by fiscal year 1986, compared with an estimated fiscal year 1986 program size of $415 million under S. 881 and current SBIR program expenditures of $10 million—fiscal year 1982.

This 160-fold increase in SBIR program expenditures over 5 years is excessive and unjustified. Such rapid growth would lead to a diminution in program quality as agencies were forced by law to expend larger sums of money than the small business sector could likely spend without compromising excellence, and as agency quality control mechanisms were stressed.

In addition, availability of such sums of money, by statutory set-aside under the SBIR program, might result in considerable shifting of small businesses away from other programs in which they now participate and the rapid incorporation of many new small businesses strictly for the purpose of having access to what might be perceived as readily available funds. The 1 percent set-aside provided by S. 881 is sufficient to achieve the purposes of this legislation and the administration cannot support a higher figure.

EXCLUSION OF INTRAMURAL RESEARCH

The administration supports the exclusion of intramural research from the base to which the SBIR set-aside is applied and strongly recommends that H.R. 4326 incorporate such an exclusion. It is unlikely that substantial amounts of intramural research can be shifted to small business. It is the nature of these in-house programs that they are dedicated to the conduct of R. & D. not ordinarily conducted by other R. & D. performers.

Since, in reality, intramural funds would not be available for the purpose of supporting an SBIR program, any percentage set-aside calculated on an agency base including intramural research would be artificially high, resulting in a percentage in excess of that mandated being applied to extramural program funds. Here, again, we prefer the approach taken by S. 881.

BASIC SCIENCE

In a similar way, the administration is concerned that federally funded basic science not bear an undue share of the total SBIR set-aside. Those funds which are available—primarily extramural basic research funds—are in danger of being taxed far in excess of the nominal percentage set-aside in order to meet the overall agency set-aside requirement.

We strongly recommend that H.R. 4326 be amended to include language designed to avoid this danger. Section 3 of S. 881 provides that basic research funds not be reduced by more than the mandated percentage set-aside in order to meet overall agency targets.

LONG-TERM PROGRAM EVALUATION

Given the experimental nature of the SBIR program, independent evaluation of the expansion of this concept is highly desirable. For this reason, we endorse the provision of S. 881 that requires the Comptroller General to evaluate the longer term significance of the research conducted under the act and recommend that H.R. 4326 provide for similar assessment. However, 2 years following enactment is too soon to expect valid data since projects would not have completed phase II at that point. Given the time required for scientific research results to be developed and assessed, evaluation will be much more useful and valid from the fourth year onward.

Further, we recommend that such evaluation include all research under the SBIR Act, not solely basic research, as now provided in section 3(g) of S. 881. We find no rationale to exclude from evaluation any of the research supported through the SBIR programs. We suggest that agencies be required to retain copies of proposals received, the review record, and final reports for funded proposals so as to enable later program evaluation.

POLICY AND MONITORING

H.R. 4326 provides that both SBA and OSTP independently survey and monitor the SBIR activities of the participating Federal agencies. We believe such duplication to be unnecessary and inappropriate. SBA is appropriately an advocate for small business, working to increase the number and dollar level of awards to its constituency. It has neither the mandate nor expertise necessary to perform the role envisioned for it.

OSTP, on the other hand, has specific responsibility for assuring the quality and balance of Federal science programs, and the expertise and coordinating mechanism necessary to meet that responsibility. Were SBIR legislation to be enacted, the Federal Coordinating Council for Science, Engineering, and Technology would be the principal mechanism through which the Director of OSTP would assure the quality and effectiveness of the several Federal SBIR programs.

Section 4(j) of H.R. 4326 provides that SBA, after consultation with other agencies, shall issue policy directives related to the SBIR programs of the mission agencies. Section 3(f) of S. 881 assigns a similar responsibility to the OFPP. We think the OFPP is the more appropriate for two reasons. First, its experience in implementing the Grant and Cooperative Agreements Act of 1977, and its efforts to simplify government procedures give it a comparative advantage in drafting directives designed to simplify the SBIR process.

Second, both because of its own broader responsibilities and because of its relationship to other units of the Executive Office of the President, the OFPP seems more likely to see the SBIR programs in the broader context of overall Federal research programs. For these reasons, we recommend that H.R. 4326 be amended to assign OFPP sole responsibility for the development and promulgation of policy directives and guidelines for the implementation of this legislation.

In summary, Mr. Chairman, the Reagan administration supports the concept underlying H.R. 4326 but finds several of its provisions sufficiently troublesome that we must oppose the enactment of this legislation in its current form.

I have recommended changes which would significantly improve H.R. 4326 and expect my colleagues from the R. & D. agencies to discuss these and others in greater detail. I emphasize that we find S. 881 as passed by the Senate to be acceptable to the administration.

That concludes my formal statement. I will be pleased to answer any questions which the committee may have.

[The prepared statement of Mr. Prager follows:]

TESTIMONY OF DENIS J. PRAGER
ASSISTANT DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
BEFORE THE
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

JANUARY 26, 1982

Mr. Chairman and members of the Committee: I am Dr. Denis J. Prager, Assistant Director of the White House Office of Science and Technology Policy. As such, I am pleased to have this opportunity to present, to the Committee, the Administration's views on H.R. 4326, "The Small Business Innovation Development Act of 1981."

This bill is founded on the premise that increased innovation by small business is a key element in efforts to strengthen the American economy by enhancing the efficiency and productivity of our industrial sector. This legislation proposes to further the goal of increased small business innovation through direct government spending arising out of federal research and development (R&D) funds set aside by participating federal R&D agencies for the support of a specific Small Business Innovation Research (SBIR) program.

Mr. Chairman, the Administration heartily supports the worthy goal of this legislation. It is clear that small businesses are, by their very nature, inventive and innovative and that facilitating invention and innovation among small firms is an important aspect of our collective efforts to strengthen industrial America.

For these reasons, the Administration supported passage by the Senate of S. 881, "The Small Business Innovation Research Act of 1981." In a letter to Senator Warren Rudman, dated October 6, 1981, President Ronald Reagan wrote:

> "I would like to express my support for S.881, the Small Business Innovation Research Act.
>
> Your concern that small firms be able to participate equitably in Federal research and development is shared by this Administration. In the long run, all sectors of the economy are likely to benefit from the increased competition and research incentives your legislation would provide.
>
> I congratulate you for the leadership you have shown in advancing the interests of those small businesses which are the job-producing lifeblood of our economy."

The Administration continues to support S. 881. That Bill, as passed by the Senate, is carefully drawn to stimulate increased federal support of small business innovation while assuring that the funding required for that support does not come inordinately at the expense of federal agency intramural research or extramural basic research conducted primarily by our colleges and universities. The required set-aside of one percent, achieved in the third year of program operation, is sufficient to permit the major federal R&D agencies to assess the effectiveness of the SBIR program in the context of their missions and operational modes. Provision for GAO evaluation of the program is also designed to assess the program's effectiveness and the nature of its impacts on the funding agencies.

Mr. Chairman, the Bill before us today, H.R. 4326, is intended to achieve the same objectives as its Senate counterpart, S. 881. However, because the House Bill departs in several significant ways from the Senate Bill passed last November, the Administration must oppose its enactment. We find H.R. 4326 to be too expansive, mandating excessive set-asides and the involvement of too many agencies, and to lack the safeguards we believe are needed to assure the continuity and integrity of federal agency intramural research and development and extramural basic science programs.

Each of the agency representatives testifying will address, in some detail, those provisions of H.R. 4326 which we specifically oppose. Let me set the stage for their comments by summarizing the Administration's concerns.

Program Size

H.R. 4326 would require that agencies with FY 82 R&D budgets in excess of $100 million establish SBIR programs and set-aside funds for their support. To date, the SBIR program is still experimental, having been tried only in two agencies (NSF and DOD) and only for a relatively short time. We do not believe it appropriate suddenly to expand this program to a dozen or more agencies without longer-term experience with a smaller number of programs. We prefer the approach taken by S. 881 which uses a formula and minimum funding base to determine which agencies must establish an SBIR program, limiting its expansion to a total of five agencies (DOD, HHS, DOE, NSF, and NASA). We recommend that H.R. 4326 be amended to include this same approach.

Level of Support

H.R. 4326 would require, after a three-year phase-in period, that three percent of the R&D budget of each federal agency with an R&D budget in excess of $100 million be set aside for support of the agency's SBIR program. The Congressional Budget Office estimates that this would result in a total federal SBIR program of $1.67 billion by FY 1986, compared with an estimated FY 1986 program size of $415 million under S. 881 and current SBIR program expenditures of $10 million (FY 1982). This 160-fold increase in SBIR program expenditures over five years is excessive and unjustified. Such rapid growth would lead to a diminution in program quality as agencies were forced by law to expend larger sums of money than the small business sector could likely spend without compromising excellence and as agency quality control mechanisms were stressed. In addition, availability of such sums of money, by statutory set-aside under the SBIR program, might result in considerable shifting of small businesses away from other programs in which they now participate and the rapid incorporation of many new small businesses strictly for the purpose of having access to what might be perceived as readily available funds. The one percent set-aside provided by S. 881 is sufficient to achieve the purposes of this legislation and the Administration cannot support a higher figure.

Exclusion of Intramural Research

The Administration supports the exclusion of intramural research from the base to which the SBIR set-aside is applied and strongly recommends that H.R. 4326 incorporate such an exclusion. It is unlikely that substantial amounts of intramural research can be shifted to small business. It is the nature of these in-house programs that they are dedicated to the conduct of R&D not ordinarily conducted by other R&D performers. Since, in reality, intramural funds would not be available for the purpose of supporting an SBIR program, any percentage set-aside calculated on an agency base including intramural research would be artificially high, resulting in a percentage in excess of that mandated being applied to extramural program funds. Here, again, we prefer the approach taken by S. 881.

Basic Science

In a similar way, the Administration is concerned that federally funded basic science not bear an undue share of the total SBIR set-aside. Those funds which are available -- primarily extramural basic research funds -- are in danger of being taxed far in excess of the nominal percentage set-aside in order to meet the overall agency set-aside requirement. We strongly recommend that H.R. 4326 be amended to include language designed to avoid this danger. Section 3 of S. 881 provides that basic research funds not be reduced by more than the mandated percentage set-aside in order to meet overall agency targets.

Long Term Program Evaluation

Given the experimental nature of the SBIR program, independent evaluation of the expansion of this concept is highly desirable. For this reason, we endorse the provision of

S. 881 that requires the Comptroller General to evaluate the longer term significance of the research conducted under the Act and recommend that H.R. 4326 provide for similar assessment. However, two years following enactment is too soon to expect valid data since projects would not have completed Phase II at that point. Given the time required for scientific research results to be developed and assessed, evaluation will be much more useful and valid from the fourth year onward. Further, we recommend that such evaluation include _all_ research under the SBIR Act, not solely basic research, as now provided in Section 3, (g) of S. 881. We find no rationale to exclude from evaluation any of the research supported through the SBIR programs. We suggest that agencies be required to retain copies of proposals received, the review record, and final reports for funded proposals so as to enable later program evaluation.

Policy and Monitoring

H.R. 4326 provides that both SBA and OSTP independently survey and monitor the SBIR activities of the participating federal agencies. We believe such duplication to be unnecessary and inappropriate. SBA is appropriately an advocate for small business, working to increase the number and dollar level of awards to its constituency. It has neither the mandate nor expertise necessary to perform the role envisioned for it.

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Section 4(j) of H.R. 4326 provides that SBA, after consultation with other agencies, shall issue policy directives related to the SBIR programs of the mission agencies. Section 3(f) of S. 881 assigns a similar responsibility to the OFPP. We think the OFPP is the more appropriate for two reasons. First, its experience in implementing the Grant and Cooperative Agreements Act of 1977, and its efforts to simplify government procedures give it a comparative advantage in drafting directives designed to simplify the SBIR process. Second, both because of its own broader responsibilities and because of its relationship to other units of the Executive Office of the President, the OFPP seems more likely to see the SBIR programs in the broader context of overall federal research programs. For these reasons, we recommend that H.R. 4326 be amended to assign OFPP sole responsibility for the development and promulgation of policy directives and guidelines for the implementation of this legislation.

In summary, Mr. Chairman, the Reagan Administration supports the concept underlying H.R. 4326 but finds several of its provisions sufficiently troublesome that we must oppose the enactment of this legislation in its current form. I have recommended changes which would significantly improve H.R. 4326 and expect my colleagues from the R&D agencies to discuss these and others in greater detail. I emphasize that we find S. 881 as passed by the Senate to be acceptable to the Administration.

That concludes my formal statement. I will be pleased to answer any questions which the Committee may have.

Mr. FUQUA. Thank you very much, Mr. Prager.

We will now hear from Donald Templeman, the Deputy Administrator of the Small Business Administration.

Mr. TEMPLEMAN. Thank you, Mr. Chairman. It is a pleasure to be here this morning to testify on H.R. 4326. Dr. Prager has very clearly laid out the administration's position on the bill, and I would like to move then to why I believe that this legislation is necessary, assuming that ultimately it approaches S. 881 more than H.R. 4326.

The concept is straightforward. Under S. 881, Federal agencies with R. & D. budgets of $100 million and over would allocate 1 percent of these resources for small business innovation research programs. Such programs would have three phases, as follows:

The first would be to determine the scientific and technical merit and feasibility of ideas submitted to the SBIR program. That, of course, would be Government funded.

The second phase would be further development of the proposed idea to meet the particular program needs. Again, that would be Government funded.

It is important that the third phase is a non-Federal-funded phase that would pursue commercial applications of the research and development. While small businesses certainly will benefit from this bill, I do not see it as basically a small business bill but rather as a bill to support technology and innovation development.

I find the case for this legislation compelling. It rests on three sets of circumstances that are different, interrelated, and important.

One. The American productivity decline and the challenge from abroad. The American economy faces a serious challenge from abroad. Productivity growth has fallen and lags behind levels achieved in Europe and Japan. We face a growing challenge to our once dominant position in technological innovation. Technological innovation is critical to economic growth, productivity, control of inflation, and our ability to remain competitive in a world marketplace.

According to a Harvard Business School professor, quoted last week in a Washington Post series on the decline of American leadership in innovation:

> By their preference for serving existing markets rather than creating new ones and by their devotion to short-term returns and "management by the numbers," many (American business managers) have effectively forsworn long-term technological superiority as a competitive weapon.

This criticism has become widely accepted in the business community. Of nearly 1,000 chief executives recently surveyed, 76 percent agreed that there has been a damaging overemphasis on short-term profits.

Two. The documented role of small business in technological innovation. The role of small business in innovation has been well documented: First, relative to the number of people employed, small firms produce 2.5 times as many innovations as large firms. In addition, small firms bring their innovations to market faster than large firms; Second, small firms accounted for almost half of major U.S. innovations between 1953 and 1973. The ratio of innovations to sales is about one third greater in small firms. The ratio of innovations to R. & D. employment is four times greater. The cost per R. & D. scientist in small firms is only half that found in large firms; and third, of 61 important inventions and innovations of the 20th century, over half came from independent inventors or small firms. Of 149 inventions in the aluminum industry, major producers accounted for only 1 in 7. Of 13 major innovations in the American steel industry, 4 came from European companies, 7 from independent inventors, and none came from American steel companies. Of seven major inventions in the refining and cracking of petroleum, all were made by independent inventors.

These are not trivial innovations we are talking about, Mr. Chairman. Just consider for a moment the following list of major 20th century inventions made by independent inventors and small businesses: xerography, DDT, insulin, the vacuum tube, rockets, streptomycin, penicillin, the cyclotron, the cottonpicker, shrinkproof knitted wear, the zipper, catalytic cracking of petroleum, automatic transmissions, the gyrocompass, the jet engine, FM radio, the self-winding wristwatch, the helicopter, power steering, Kodachrome, air-conditioning, the Polaroid camera, and the ballpoint pen.

The point is unmistakable. Significant innovations are more likely to come from small businesses and independent inventors than from the large, institutionalized research laboratory. The reasons are many. In the small business there can be a more creative environment. Rules are less formal.

There is no large bureaucracy to contend with. The boss is typically the person with the drive to be innovative. Frequently the heads of such small innovative firms have left universities or large corporations in order to strike out on their own and run their own enterprises.

Incentives are greater: There is a sense of creating an organization and personal involvement with the innovation. People work longer and harder. There is not the intense pressure for short-lived investments with quick cash payoffs that is found in big business. Indeed, the whole purpose of innovative small firms is to make and market the technological breakthroughs that will enable them to become large firms.

Based upon the foregoing evidence, Mr. Chairman, I hope that we can dispel two widespread but untrue stereotypes. The first is that nearly all new inventive concepts come from the research labs of large universities or large corporations. The second is that the small business firms we are talking about are simply the research equivalent of a mom and pop grocery store. They are not. They are very sophisticated firms.

Three. The Federal Government's attitude toward research and development by small business. In the face of declining American technological superiority and the documented role of high technology small business, what has been the Federal Government's attitude toward supporting small business' efforts at technological innovation?

Well, back in 1904 the Federal Government declined a small business' offer to develop an innovation for governmental use. Before the Government would spend a dime, the "device must have been brought to the stage of practical operation without expense to the U.S. Government."

In other words, no R. & D. for small business. Mr. Chairman, the small business in this example was owned by Wilbur and Orville Wright, and their innovation was the airplane. Without exaggeration, one can safely say that the Federal Government's attitude has not changed much in the past 80 years.

In a major study on invention on the industrial research laboratory, Daniel Hamberg concludes:

> Without any careful consideration, the laboratories of the large industrial corporations have been receiving all the accolades and most of the support.
>
> Although it appears that the bulk of major inventions originate outside these laboratories, particularly in the work of independent inventors and small and medium-size firms, these sources have been relatively neglected and their potential contributions virtually ignored—at least in our formal policies. It seems clear that future efforts to foster technological process must cease this neglect and develop ways of supporting these well springs of fundamental advances in the arts.

Despite small businesses' well documented success in the innovation field, its 40-percent-plus share of GNP, and its job-creation ability—small business has received less than 4.1 percent of the Federal Government's R. & D. budget. Only 8.1 percent of the portion awarded as contracts goes to small business. The reasons for small businesses' low participation are many. Complex regulations place a premium on lawyers, accountants, and procurement specialists—luxuries a small business cannot afford.

We are aware of many small business operators who never bother to try because of the paperwork and regulatory barriers. Additionally, in many instances small R. & D. firms refuse to compete with large industry and nonprofit institutions. Frankly, complex regulations also serve as a disincentive for agency officials. Dealing with small firms requires more patience and guidance.

It is simply easier to work with the large firms. And a bias in favor of large firms can exist when awarding R. & D. contracts. There is a tendency on the part of engineering and contracting officials to consider awards to large well-established firms safer than to small firms.

We have made substantial progress toward eliminating the obstacles standing in the way of innovation. The last Congress removed some of those barriers. Public Law 96-517 was the first patent system reform in many years. Among the reforms were improvements in small businesses' ability to retain title to patents developed with Federal funds.

Public Law 96-477, the Small Business Investment Incentives Act, should improve the opportunities for small businesses in the high technology field to raise capital. Public Law 96-354, the Regulatory Flexibility Act; Public Law 96-481, equal access to justice; and Public Law 96-511, the Paperwork Reduction Act, should all help reduce the regulatory burden imposed on small companies by the Government.

Finally, the Economic Recovery Tax Act of 1981 (Public Law 97-34) will provide an incentive to businesses to increase their own R. & D. expenditures. What remains is improving small business' access to Federal R. & D. budgets.

For all the foregoing reasons, Mr. Chairman, the administration is supportive of efforts to create an environment in which the talent of the small business sector can be better utilized in the promotion of innovation. Let me briefly discuss with you what S. 881 would accomplish: First, for the Government—an R. & D. collaboration with the most innovative sector of the economy. The SBIR program insures money will be spent on projects that contribute to the Government's specific R. & D. needs. The SBIR program would not change the current mission of any Federal agency; second, for high-technology R. & D. firms—a fair chance to compete for Federal R. & D. procurements—through regular rather than sporadic solicitations, greatly simplified paperwork requirements, and seed money. The latter is very important. Small high-technology firms typically do not have sufficient cash flow to finance the early stages of product development, which is sometimes referred to as the "proof of concept stage." Outside capital is needed. But such firms are typified by a high debt to equity ratio, which limits the amount of outside capital that can be raised through conventional sources. And venture capitalists will usually not invest in such firms until a prototype of the product has been developed. Thus there is a gap in our system for financing innovation: No seed money for small high-technology firms. This gap would be at least partially filled in by the passage of S. 881; and finally, for the American economy—the legislation would provide a shot in the arm. At a time when the American ability to compete in the world marketplace is under serious attack, this legislation would open up opportunities for forward-looking, innovation-minded small firms to create new markets and new jobs.

The administration therefore strongly supports S. 881 as passed by the Senate.

Mr. Chairman, I invite your attention to comments other agencies will make in their testimony concerning certain clarifications they believe to be necessary if the intent of Congress is to be followed. Many of these comments concern current procurement law and practice and its impact on the SBIR programs as included in the H.R. 4326.

I believe that legislation must be drafted with sufficient flexibility to accommodate different agency missions. I also believe that the technical procurement problems can easily be accommodated under the provisions of S. 881.

This concludes my oral summary and I would be glad to answer any questions.

[The prepared statement of Mr. Templeman follows:]

SBA
U.S. Small Business Administration
Washington, D.C. 20416

STATEMENT OF
DONALD TEMPLEMAN, DEPUTY ADMINISTRATOR
U.S. SMALL BUSINESS ADMINISTRATION
BEFORE THE
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

JANUARY 26, 1982

MR. CHAIRMAN AND MEMBERS OF THIS SUBCOMMITTEE:

IT IS AN HONOR AND A PLEASURE TO BE HERE TODAY TO TESTIFY ON H.R. 4326, THE SMALL BUSINESS INNOVATION DEVELOPMENT ACT. PRESIDENT REAGAN HAS ENDORSED THE COUNTERPART BILL, S. 881, THAT THE SENATE HAS PASSED BY A VOTE OF 90 TO 0. I WOULD LIKE TO REQUEST THAT A COPY OF HIS LETTER OF ENDORSEMENT BE ENTERED INTO THE RECORD. I AM PLEASED TO JOIN THE PRESIDENT IN ENDORSING S. 881. FOR REASONS THAT OTHER WITNESSES WILL DISCUSS IN GREATER DETAIL, THE ADMINISTRATION OPPOSES THOSE PARTS OF H.R. 4326 THAT DEVIATE FROM S. 881.

WHY S. 881 IS NEEDED

I SHOULD LIKE TO USE MY ALLOTTED TIME PRIMARILY TO DISCUSS THE NEED FOR THIS LEGISLATION. THE CONCEPT IS STRAIGHTFORWARD. UNDER S. 881 FEDERAL AGENCIES WITH R&D BUDGETS OF $100 MILLION AND OVER WOULD ALLOCATE ONE PERCENT OF THESE RESOURCES FOR SMALL BUSINESS INNOVATION RESEARCH PROGRAMS. SUCH PROGRAMS WOULD HAVE THREE PHASES, AS FOLLOWS:

- PHASE ONE WOULD DETERMINE THE SCIENTIFIC AND TECHNICAL MERIT AND FEASIBILITY OF IDEAS SUBMITTED TO THE SBIR PROGRAM;

- PHASE TWO WOULD FURTHER DEVELOP THE PROPOSED IDEA TO MEET THE PARTICULAR PROGRAM NEEDS;

- IN PHASE THREE, NON-FEDERAL CAPITAL WOULD PURSUE COMMERCIAL APPLICATIONS OF THE RESEARCH AND DEVELOPMENT.

I FIND THE CASE FOR THIS LEGISLATION COMPELLING, MR. CHAIRMAN. IT RESTS ON THREE SETS OF CIRCUMSTANCES THAT ARE DIFFERENT, INTER-RELATED, AND IMPORTANT:

1. AMERICAN PRODUCTIVITY DECLINE AND THE CHALLENGE FROM ABROAD. THE AMERICAN ECONOMY FACES A SERIOUS CHALLENGE FROM ABROAD. PRODUCTIVITY GROWTH HAS FALLEN AND LAGS BEHIND LEVELS ACHIEVED IN EUROPE AND JAPAN. WE FACE A GROWING CHALLENGE TO OUR ONCE DOMINANT POSITION IN TECHNOLOGICAL INNOVATION FROM JAPAN, FROM GERMANY AND FROM OTHER COUNTRIES ALL OVER THE WORLD. TECHNOLOGICAL INNOVATION IS CRITICAL TO ECONOMIC GROWTH, PRODUCTIVITY, THE CONTROL OF INFLATION AND OUR ABILITY

TO REMAIN COMPETITIVE IN THE WORLD MARKETPLACE. ACCORDING TO A HARVARD BUSINESS SCHOOL PROFESSOR QUOTED LAST WEEK IN A WASHINGTON POST SERIES ON THE DECLINE OF AMERICAN LEADERSHIP IN INNOVATION, "BY THEIR PREFERENCE FOR SERVING EXISTING MARKETS RATHER THAN CREATING NEW ONES AND BY THEIR DEVOTION TO SHORT-TERM RETURNS AND 'MANAGEMENT BY THE NUMBERS,' MANY (AMERICAN BUSINESS MANAGERS) HAVE EFFECTIVELY FORSWORN LONG-TERM TECHNOLOGICAL SUPERIORITY AS A COMPETITIVE WEAPON." THIS CRITICISM HAS BECOME WIDELY ACCEPTED IN THE BUSINESS COMMUNITY. OF NEARLY 1,000 CHIEF EXECUTIVES RECENTLY SURVEYED, 76 PERCENT AGREED THAT THERE HAS BEEN A DAMAGING OVER-EMPHASIS ON SHORT TERM PROFITS.

2. THE DOCUMENTED ROLE OF SMALL BUSINESS IN TECHNOLOGICAL INNOVATION. THE ROLE OF SMALL BUSINESS IN INNOVATION HAS BEEN WELL DOCUMENTED:

- RELATIVE TO THE NUMBER OF PEOPLE EMPLOYED, SMALL FIRMS PRODUCE 2.5 TIMES AS MANY INNOVATIONS AS LARGE FIRMS. IN ADDITION, SMALL FIRMS BRING THEIR INNOVATIONS TO MARKET FASTER THAN LARGE FIRMS.(1)

- SMALL FIRMS ACCOUNTED FOR ALMOST HALF OF MAJOR U.S. INNOVATIONS BETWEEN 1953 AND 1973. THE RATIO OF INNOVATIONS TO SALES IS ABOUT 1/3 GREATER IN SMALL FIRMS. THE RATIO OF INNOVATIONS TO R&D EMPLOYMENT

IS 4 TIMES GREATER. THE COST PER R&D SCIENTIST IN SMALL FIRMS IS ONLY HALF THAT FOUND IN LARGE FIRMS.(2)

o OF 61 IMPORTANT INVENTIONS AND INNOVATIONS OF THE TWENTIETH CENTURY, OVER HALF CAME FROM INDEPENDENT INVENTORS OR SMALL FIRMS.(3) OF 149 INVENTIONS IN THE ALUMINUM INDUSTRY, MAJOR PRODUCERS ACCOUNTED FOR ONLY ONE IN SEVEN.(4) OF 13 MAJOR INNOVATIONS IN THE AMERICAN STEEL INDUSTRY, FOUR CAME FROM EUROPEAN COMPANIES, SEVEN FROM INDEPENDENT INVENTORS AND NONE CAME FROM AMERICAN STEEL COMPANIES.(5) OF SEVEN MAJOR INVENTIONS IN THE REFINING AND CRACKING OF PETROLEUM, ALL WERE MADE BY INDEPENDENT INVENTORS.(6)

THESE ARE NOT TRIVIAL INNOVATIONS WE ARE TALKING ABOUT, MR. CHAIRMAN. JUST CONSIDER FOR A MOMENT THE FOLLOWING LIST OF MAJOR TWENTIETH CENTURY INVENTIONS MADE BY INDEPENDENT INVENTORS AND SMALL BUSINESSES: XEROGRAPHY, DDT, INSULIN, THE VACUUM TUBE, ROCKETS, STREPTOMYCIN, PENICILLIN, THE CYCLOTRON, THE COTTON PICKER, SHRINK-PROOF KNITTED WEAR, THE ZIPPER, CAYALYTIC CRACKING OF PETROLEUM, AUTOMATIC TRANSMISSIONS, THE GYROCOMPASS, THE JET ENGINE, FM RADIO, THE SELF-WINDING WRISTWATCH, THE HELOCOPTER, POWER STEERING, KODACHROME, AIR CONDITIONING, THE POLAROID CAMERA AND THE BALLPOINT PEN.(7)

THE POINT IS UNMISTAKABLE. SIGNIFICANT INNOVATIONS ARE MORE LIKELY TO COME FROM SMALL BUSINESSES AND INDEPENDENT INVENTORS THAN FROM THE LARGE, INSTITUTIONALIZED RESEARCH LABORATORY. THE REASONS ARE MANY. IN THE SMALL BUSINESS THERE CAN BE A MORE CREATIVE ENVIRONMENT. RULES ARE LESS FORMAL. THERE IS NO LARGE BUREAUCRACY TO CONTEND WITH. THE BOSS IS TYPICALLY THE PERSON WITH THE DRIVE TO BE INNOVATIVE. FREQUENTLY THE HEADS OF SUCH SMALL INNOVATIVE FIRMS HAVE LEFT UNIVERSITIES OR LARGE CORPORATIONS IN ORDER TC STRIKE OUT ON THEIR OWN AND RUN THEIR OWN ENTERPRISES. INCENTIVES ARE GREATER: THERE IS A SENSE OF CREATING AN ORGANIZATION AND PERSONAL INVOLVEMENT WITH THE INNOVATION. PEOPLE WORK LONGER AND HARDER. THERE IS NOT THE INTENSE PRESSURE FOR SHORT-LIVED INVESTMENTS WITH QUICK CASH PAYOFFS THAT IS FOUND IN BIG BUSINESS. INDEED, THE WHOLE PURPOSE OF INNOVATIVE SMALL FIRMS IS TO MAKE AND MARKET THE TECHNOLOGICAL BREAKTHROUGHS THAT WILL ENABLE THEM TO BECOME LARGE FIRMS.

BASED UPON THE FOREGOING EVIDENCE, MR. CHAIRMAN, I HOPE THAT WE CAN DISPEL TWO WIDESPREAD BUT UNTRUE STEREOTYPES. THE FIRST IS THAT NEARLY ALL NEW INVENTIVE CONCEPTS COME FROM THE RESEARCH LABS OF LARGE UNIVERSITIES OR LARGE CORPORATIONS. THE SECOND IS THAT THE SMALL BUSINESS FIRMS WE ARE TALKING ABOUT ARE SIMPLY THE RESEARCH EQUIVALENT OF A MOM AND POP GROCERY STORE.

3. THE FEDERAL GOVERNMENT'S ATTITUDE TOWARD RESEARCH AND DEVELOPMENT BY SMALL BUSINESS. IN THE FACE OF DECLINING AMERICAN TECHNOLOGICAL SUPERIORITY AND THE DOCUMENTED ROLE OF HIGH TECHNOLOGY SMALL BUSINESS, WHAT HAS BEEN THE FEDERAL GOVERNMENT'S ATTITUDE TOWARD SUPPORTING SMALL BUSINESS' EFFORTS AT TECHNOLOGICAL INNOVATION? WELL, BACK IN 1904 THE FEDERAL GOVERNMENT DECLINED A SMALL BUSINESS' OFFER TO DEVELOP AN INNOVATION FOR GOVERNMENTAL USE. BEFORE THE GOVERNMENT WOULD SPEND A DIME, THE "DEVICE MUST HAVE BEEN BROUGHT TO THE STAGE OF PRACTICAL OPERATION WITHOUT EXPENSE TO THE U.S. GOVERNMENT." IN OTHER WORDS, NO R&D FOR SMALL BUSINESS. MR. CHAIRMAN, THE SMALL BUSINESS IN THIS EXAMPLE WAS OWNED BY WILBUR AND ORVILLE WRIGHT, AND THEIR INNOVATION WAS THE AIRPLANE.

WITHOUT EXAGERATION ONE CAN SAFELY SAY THAT THE FEDERAL GOVERNMENT'S ATTITUDE HAS NOT CHANGED MUCH IN THE PAST 80 YEARS. IN A MAJOR STUDY ON INVENTION IN THE INDUSTRIAL RESEARCH LABORATORY, DANIEL HAMBERG CONCLUDES THAT "WITHOUT ANY CAREFUL CONSIDERATION, THE LABORATORIES OF THE LARGE INDUSTRIAL CORPORATIONS HAVE BEEN RECEIVING ALL THE ACCOLADES AND MOST OF THE SUPPORT. ALTHOUGH IT APPEARS THAT THE BULK OF MAJOR INVENTIONS ORIGINATE OUTSIDE THESE LABORATORIES, PARTICULARLY

IN THE WORK OF INDEPENDENT INVENTORS AND SMALL-AND MEDIUM-SIZE FIRMS, THESE SOURCES HAVE BEEN RELATIVELY NEGLECTED AND THEIR POTENTIAL CONTRIBUTIONS VIRTUALLY IGNORED--AT LEAST IN OUR FORMAL POLICIES. IT SEEMS CLEAR THAT FUTURE EFFORTS TO FOSTER TECHNOLOGICAL PROCESS MUST CEASE THIS NEGLECT AND DEVELOP WAYS OF SUPPORTING THESE WELLSPRINGS OF FUNDAMENTAL ADVANCES IN THE ARTS."(8)

DESPITE SMALL BUSINESSES' WELL DOCUMENTED SUCCESS IN THE INNOVATION FIELD, ITS 40 PERCENT-PLUS SHARE OF GNP, AND ITS JOB CREATION ABILITY -- SMALL BUSINESS HAS RECEIVED LESS THAN 4.1 PERCENT OF THE FEDERAL GOVERNMENT'S R&D BUDGET. ONLY 8.1 PERCENT OF THE PORTION AWARDED AS CONTRACTS GOES TO SMALL BUSINESS. THE REASONS FOR SMALL BUSINESSES' LOW PARTICIPATION ARE MANY. COMPLEX REGULATIONS PLACE A PREMIUM ON LAWYERS, ACCOUNTANTS, AND PROCUREMENT SPECIALISTS - LUXURIES A SMALL BUSINESS CANNOT AFFORD. WE ARE AWARE OF MANY SMALL BUSINESS OPERATORS WHO NEVER BOTHER TO TRY BECAUSE OF THE PAPERWORK AND REGULATORY BARRIERS. ADDITIONALLY, IN MANY INSTANCES SMALL R&D FIRMS REFUSE TO COMPETE WITH LARGE INDUSTRY AND NONPROFIT INSTITUTIONS. FRANKLY, COMPLEX REGULATIONS ALSO SERVE AS A DISINCENTIVE FOR AGENCY OFFICIALS. DEALING WITH SMALL FIRMS REQUIRES MORE PATIENCE AND GUIDANCE. IT IS SIMPLY EASIER TO WORK WITH THE LARGE FIRMS. AND A BIAS IN FAVOR OF LARGE FIRMS

CAN EXIST WHEN AWARDING R&D CONTRACTS. THERE IS A TENDENCY ON THE PART OF CONTRACTING OFFICIALS TO CONSIDER AWARDS TO LARGE WELL-ESTABLISHED FIRMS "SAFER" THAN TO SMALL FIRMS.

WE HAVE MADE SUBSTANTIAL PROGRESS TOWARD ELIMINATING THE OBSTACLES STANDING IN THE WAY OF INNOVATION. THE LAST CONGRESS REMOVED SOME OF THOSE BARRIERS. PUBLIC LAW 96-517 WAS THE FIRST PATENT SYSTEM REFORM IN MANY YEARS. AMONG THE REFORMS WERE IMPROVEMENTS IN SMALL BUSINESSES' ABILITY TO RETAIN TITLE TO PATENTS DEVELOPED WITH FEDERAL FUNDS.

PUBLIC LAW 96-477, THE SMALL BUSINESS INVESTMENT INCENTIVES ACT, SHOULD IMPROVE THE OPPORTUNITIES FOR SMALL BUSINESSES IN THE HIGH TECHNOLOGY FIELD TO RAISE CAPITAL. PUBLIC LAW 96-354, THE REGULATORY FLEXIBILITY ACT; PUBLIC LAW 96-481, EQUAL ACCESS TO JUSTICE; AND PUBLIC LAW 96-511, THE PAPERWORK REDUCTION ACT, SHOULD ALL HELP REDUCE THE REGULATORY BURDEN IMPOSED ON SMALL COMPANIES BY THE GOVERNMENT. FINALLY, THE ECONOMIC RECOVERY TAX ACT OF 1981 (PUBLIC LAW 97-34) WILL PROVIDE AN INCENTIVE TO BUSINESSES TO INCREASE THEIR OWN R&D EXPENDITURES. WHAT REMAINS IS IMPROVING SMALL BUSINESSES' ACCESS TO FEDERAL R&D BUDGETS.

WHAT THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM WOULD ACCOMPLISH

FOR ALL THE FOREGOING REASONS, MR. CHAIRMAN, THE ADMINISTRATION IS SUPPORTIVE OF EFFORTS TO CREATE AN ENVIRONMENT IN WHICH THE TALENT OF THE SMALL BUSINESS SECTOR CAN BE BETTER UTILIZED IN THE PROMOTION OF INNOVATION. LET ME BRIEFLY DISCUSS WITH YOU WHAT S. 881 WOULD ACCOMPLISH.

- FOR THE GOVERNMENT-- AN R&D COLLABORATION WITH THE MOST INNOVATIVE SECTOR OF THE ECONOMY. THE SBIR PROGRAM ENSURES MONEY WILL BE SPENT ON PROJECTS THAT CONTRIBUTE TO THE GOVERNMENT'S SPECIFIC R&D NEEDS. THE SBIR PROGRAM WOULD NOT CHANGE THE CURRENT MISSION OF ANY FEDERAL AGENCY.

- FOR HIGH TECHNOLOGY R&D FIRMS -- A FAIR CHANCE TO COMPETE FOR FEDERAL R&D PROCUREMENTS -- THROUGH REGULAR RATHER THAN SPORADIC SOLICITATIONS, GREATLY SIMPLIFIED PAPERWORK REQUIREMENTS, AND SEED MONEY. THE LATTER IS VERY IMPORTANT. SMALL HIGH TECHNOLOGY FIRMS TYPICALLY DO NOT HAVE SUFFICIENT CASH FLOW TO FINANCE THE EARLY STAGES OF PRODUCT DEVELOPMENT, WHICH IS SOMETIMES

REFERRED TO AS THE "PROOF OF CONCEPT STAGE." OUTSIDE CAPITAL IS NEEDED. BUT SUCH FIRMS ARE TYPIFIED BY A HIGH DEBT TO EQUITY RATIO, WHICH LIMITS THE AMOUNT OF OUTSIDE CAPITAL THAT CAN BE RAISED THROUGH CONVENTIONAL SOURCES. AND VENTURE CAPITALISTS WILL USUALLY NOT INVEST IN SUCH FIRMS UNTIL A PROTOTYPE OF THE PRODUCT HAS BEEN DEVELOPED. THUS THERE IS A GAP IN OUR SYSTEM FOR FINANCING INNOVATION: NO SEED MONEY FOR SMALL HIGH TECHNOLOGY FIRMS. THIS GAP WOULD BE AT LEAST PARTIALLY FILLED IN BY THE PASSAGE OF S. 881. AND FINALLY --

o FOR THE AMERICAN ECONOMY -- THE LEGISLATION WOULD PROVIDE A SHOT IN THE ARM. AT A TIME WHEN THE AMERICAN ABILITY TO COMPETE IN THE WORLD MARKET PLACE IS UNDER SERIOUS ATTACK, THIS LEGISLATION WOULD OPEN UP OPPORTUNITIES FOR FORWARD LOOKING, INNOVATION-MINDED SMALL FIRMS TO CREATE NEW MARKETS AND NEW JOBS.

THE ADMINISTRATION THEREFORE STRONGLY SUPPORTS S. 881 AS PASSED BY THE SENATE.

MR. CHAIRMAN, I INVITE YOUR ATTENTION TO COMMENTS OTHER AGENCY'S WILL MAKE IN THEIR TESTIMONY CONCERNING CERTAIN CLARIFICATIONS THEY BELIEVE TO BE NECESSARY IF THE INTENT OF CONGRESS IS TO BE FOLLOWED. MANY OF THESE COMMENTS CONCERN

CURRENT PROCUREMENT LAW AND PRACTICE AND ITS IMPACT ON THE SBIR PROGRAMS AS INCLUDED IN THE H.R. 4326. I BELIEVE THAT LEGISLATION MUST BE DRAFTED WITH SUFFICIENT FLEXIBILITY TO ACCOMMODATE DIFFERENT AGENCY MISSIONS. I ALSO BELIEVE THAT THE TECHNICAL PROCUREMENT PROBLEMS CAN EASILY BE ACCOMMODATED UNDER THE PROVISIONS OF S. 881.

MR. CHAIRMAN, I WOULD NOW LIKE TO RESPOND TO YOUR REQUEST THAT I DESCRIBE THE SMALL BUSINESS ADMINISTRATION'S RESPONSIBILITIES UNDER SECTIONS 9 AND 15 OF THE SMALL BUSINESS ACT.

SBA ASSISTANCE TO SMALL R&D FIRMS

SECTION 9 OF THE SMALL BUSINESS ACT DIRECTS SBA TO PROVIDE SEVERAL TYPES OF ASSISTANCE TO SMALL BUSINESSES IN THE GENERAL AREAS OF RESEARCH AND DEVELOPMENT.

ON A DAILY BASIS, SBA REVIEWS THE COMMERCE BUSINESS DAILY FOR "RESEARCH AND DEVELOPMENT SOURCES SOUGHT." THESE REQUIREMENTS ARE CHECKED AGAINST THE PROCUREMENT AUTOMATED SOURCE SYSTEM (PASS) DATA BASE, AND COMPANIES MEETING THE REQUISITE CAPABILITIES ARE NOTIFIED BY SBA OF THE PROCUREMENT OPPORTUNITY.

UNDER SECTION 9 OF THE SMALL BUSINESS ACT, THE SMALL BUSINESS ADMINISTRATION IS CALLED UPON " . . . TO CONDUCT A PROGRAM

WHICH WOULD DELIVER TO SMALL BUSINESS CONCERNS THE BENEFITS OF RESEARCH AND DEVELOPMENT PERFORMED UNDER GOVERNMENT CONTRACTS OR AT GOVERNMENT EXPENSE." THE TECHNOLOGY ASSISTANCE PROGRAM IS ACCOMPLISHING THIS MANDATE IN A NUMBER OF WAYS. OUR PRIMARY EFFORT OF TECHNOLOGY TRANSFER IS TO LOCATE THE BEST AVAILABLE TECHNOLOGY TO ASSIST THE SMALL FIRMS IN SOLVING A PROBLEM, IMPROVING A PROCESS, OR DEVELOPING A NEW PRODUCT.

SBA HAS TECHNOLOGY ASSISTANCE OFFICERS (TAOS) IN MOST REGIONAL OFFICES. THE TAOS UTILIZE A VARIETY OF RESOURCES AND DATA BANKS TO IDENTIFY THE APPROPRIATE TECHNOLOGY AND MAKE IT AVAILABLE TO THE SMALL FIRMS THAT HAVE REQUESTED ASSISTANCE.

IN A COOPERATIVE AGREEMENT WITH NASA, SBA HAS CONTINUED ITS TECHNOLOGY ASSISTANCE PROJECTS WITH THE NASA INDUSTRIAL APPLICATION CENTER AT THE UNIVERSITY OF SOUTHERN CALIFORNIA, THE NEW ENGLAND RESEARCH APPLICATION CENTER (NERAC) AT THE UNIVERSITY OF CONNECTICUT, THE KERR INDUSTRIAL APPLICATION CENTER (KIAC) AT SOUTHEASTERN OKLAHOMA STATE UNIVERSITY, AND THE AEROSPACE RESEARCH APPLICATION CENTER AT INDIANA/PURDUE UNIVERSITY, INDIANAPOLIS, INDIANA.

A CONTRACT WITH THE CENTER FOR RESEARCH, INC. AT THE UNIVERSITY OF KANSAS CONTINUES TO SERVE SMALL BUSINESSES IN THE FOUR-STATE AREA OF MISSOURI, KANSAS, IOWA, AND NEBRASKA.

SBA PARTICIPATES IN CONFERENCES WITH OTHER FEDERAL AGENCIES (I.E., DOE, NASA, NSF) TO BRING CONTRACTING OPPORTUNITIES TO THE ATTENTION OF SMALL R&D FIRMS.

ON AN ONGOING BASIS, SBA UTILIZES PASS TO FURNISH THE NAMES OF SMALL R&D FIRMS TO FEDERAL AGENCIES AND PRIVATE SECTOR ORGANIZATIONS FOR THE PURPOSE OF NOTIFYING THEM OF PURCHASING SEMINARS AND TECHNICAL MEETINGS THAT WOULD FURTHER THEIR INTERESTS IN GOVERNMENT CONTRACTING OPPORTUNITIES.

SBA ACTIVITIES UNDER PUBLIC LAW 95-507

SECTION 15G OF THE SMALL BUSINESS ACT, WHICH WAS ADDED TO THE SMALL BUSINESS ACT BY SECTION 221 OF PUBLIC LAW 95-507, REQUIRES THAT THE HEAD OF EACH FEDERAL AGENCY WILL, IN CONSULTATION WITH THE SMALL BUSINESS ADMINISTRATION, JOINTLY ESTABLISH GOALS FOR THE AWARD OF CONTRACTS WITH A VALUE OF $10,000 OR MORE TO SMALL BUSINESS CONCERNS AND SMALL BUSINESS CONCERNS OWNED AND CONTROLLED BY SOCIALLY AND ECONOMICALLY DISADVANTAGED INDIVIDUALS.

UNDER THIS AUTHORITY THE SMALL BUSINESS ADMINISTRATION HAS REQUIRED THAT EACH EXECUTIVE BRANCH AGENCY SUBMIT A PROPOSED GOAL FOR THE FISCAL YEAR (1) FOR PRIME CONTRACTS AWARDS TO SMALL AND SMALL DISADVANTAGED BUSINESS, (2) FOR PRIME CONTRACT

AWARDS TO BE MADE TO THE SMALL BUSINESS ADMINISTRATION FOR SUBSEQUENT SUBCONTRACTING UNDER SECTION 8(A) OF THE SMALL BUSINESS ACT, (3) FOR PRIME CONTRACT AWARDS TO SMALL BUSINESS CONCERNS OWNED AND CONTROLLED BY WOMEN (EXECUTIVE ORDER 12138), (4) FOR PRIME CONTRACT AWARDS TO BUSINESS CONCERNS IN LABOR SURPLUS AREAS (EXECUTIVE ORDER 12073), (5) AN ESTIMATE OF THE TOTAL DOLLAR AMOUNT OF SUBCONTRACTS TO BE AWARDED BY EACH AGENCY'S REPORTING PRIME CONTRACTORS, (6) A GOAL FOR SUBCONTRACT AWARDS TO SMALL BUSINESS AND A SEPARATE GOAL FOR SMALL DISADVANTAGED BUSINESS BASED ON THE DOLLARS TO BE SUBCONTRACTED BY THE AGENCY'S REPORTING PRIME CONTRACTORS, AND (7) A DETAILED WRITTEN SUBMISSION OF THE METHOD USED TO ESTABLISH THE ESTIMATES AND GOALS JUST MENTIONED.

UPON RECEIPT OF EACH AGENCY'S SUBMISSION, THE SBA ANALYZES THE GOAL PRESENTATION AND, BASED UPON THE RESULTS OF THIS ANALYSIS, EITHER CONCURS IN THE GOALS AS SUBMITTED OR ENTERS INTO A PERIOD OF NEGOTIATION WITH REPRESENTATIVES OF THOSE AGENCIES WHOSE GOALS, IN THE OPINION OF THE SBA, DO NOT REALISTICALLY REFLECT THE POTENTIAL OF SMALL AND SMALL DISADVANTAGED BUSINESS TO PERFORM CONTRACTS AND SUBCONTRACTS TO BE AWARDED. IF THROUGH THE NEGOTIATION PROCESS THE SBA CANNOT REACH AGREEMENT WITH THE AGENCY INVOLVED, THEN THE ENTIRE MATTER IS REFERRED TO THE ADMINISTRATOR, OFFICE OF FEDERAL PROCUREMENT POLICY, FOR FINAL DETERMINATION. IN THE CASE OF PROPOSED GOALS FOR

COMPANIES IN LABOR SURPLUS AREAS, THE GENERAL SERVICES ADMINISTRATION, UPON RECEIPT OF THESE GOALS FROM SBA, CONDUCTS THE REQUIRED NEGOTIATION AND FURNISHES THE RESULTS TO SBA.

THE PROCESS HAS CONTINUED TO IMPROVE SINCE THE INITIAL YEAR AND SBA REPRESENTATIVES ARE CURRENTLY IN NEGOTIATION WITH THE MAJOR PROCURING AGENCIES. AS THE PROCESS CONTINUES, WE ANTICIPATE FURTHER IMPROVEMENT WITH RESULTANT INCREASE IN AWARDS TO SMALL AND SMALL DISADVANTAGED BUSINESS.

MR. CHAIRMAN, THIS CONCLUDES MY PREPARED REMARKS. I WOULD BE PLEASED TO ANSWER ANY QUESTIONS.

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(3) Jewkes, J. et al. The Sources of Invention. St. Martin's Press, 1958.

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(6) Enos. J.L., "Invention and Innovation in the Petroleum Refining Industry," in Rate and Direction of Innovation Activity, op. cit.

(7) Technologial Innovation: Its Environment and Management, Department of Commerce, 1967. Report of the Panel on Invention and Innovation. (The Chappie Report)

(8) Hamberg, "Invention and Innovation," op. cit.

Mr. **Fuqua**. Thank you very much, Mr. Templeman.

Dr. Prager, a few months ago I was reading the testimony taken before the Small Business Committee when they held hearings on H.R. 4326. You testified at that time in opposition to what was contained in the bill then of 1 percent, and shortly thereafter, the President announced his support for S. 881.

I assume you were speaking for the administration at that time. Had they not taken a position or did the President change his mind? What prompted the change of support of even 1 percent that you testified in opposition to at that hearing?

Mr. **Prager**. Mr. Chairman, our office was involved in the decision in both cases. The administration was not enthusiastic about the whole idea of the set-aside. However, Senator Rudman is a fairly persuasive gentleman. He talked directly to the President. The President asked those of us involved to look at the legislation under different lights. It was the President's personal decision, given the nature of small business and what he is trying to do generally to reinvigorate the economy, that this was a worthwhile bill to support even though the administration still was not enthusiastic about the concept of a set-aside, and given the NSF experience particularly, that it was worthwhile doing the limited expansion of the program envisioned in S. 881.

Mr. **Fuqua**. Mr. Templeman, Dr. Prager in his testimony suggested that instead of having the Small Business Administration administer the program, that it should be with the Office of Federal Procurement Policy. In your testimony, you did not address that issue. Have you any feeling about that?

Mr. **Templeman**. Yes, sir. I believe it is appropriate for the Office of Federal Procurement Policy to issue directives that pertain to Government procurement systems throughout the Government. Certainly I would expect SBA to have some coordinating function in that, under S. 881.

Mr. **Fuqua**. You were here at the time Mr. Gore mentioned the fact he would propose such an amendment to do that. So the Small Business Administration would have no objection to that type of approach?

Mr. **Templeman**. Not at all. We would agree with that.

Mr. **Fuqua**. Dr. Prager, if small business was unable to absorb the funds available under the bill as outlined, should we modify the legislation to enable the agencies to utilize the funds wisely, for instance, maybe there would be quality controls applied, or should they be needed?

Mr. **Prager**. It is my sense that each of the agencies that has extramural funds available for the SBIR program has in place quality control mechanisms that it uses for other extramural programs. The peer review or other quality control programs or actions that are used to control the quality of this program should be no less than that used for every other program. We must assure that the SBIR program in every way is of the same quality as the other programs.

We have thought a great deal about whether or not the legislation should contain some provision for reversion of SBIR program funds to other programs if the funds were not taken up by the

SBIR program, and I think it is something this committee should definitely take a look at.

Some feel that, if an agency has done its best to advertise the programs and to get the funds out via quality control mechanisms that are the same as those used for other programs yet, for some reason, has not been able to expend up to the mandated set-aside, it should not be punished by losing those funds but that those funds should revert to other programs.

How we do that in legislation I am not sure, but I think it is worthy of this committee's consideration.

Mr. FUQUA. Mr. Lundine.

Mr. LUNDINE. I have no questions.

Mr. FUQUA. Mr. Lowry. Mr. White.

Mr. WHITE. Thank you, Mr. Chairman.

Dr. Prager, you probably heard my earlier questions addressed to the Senator, insisting that the person or company bidding on a contract be competent within themselves to perform. Do you think it would be well to have some definition in this bill to make certain those companies are capable within themselves to perform if they are awarded the contract?

Mr. PRAGER. I am not exactly sure how you would do that in legislation. Again, this gets back to the quality control mechanisms that are in place. For example, the National Institutes of Health and the National Science Foundation have peer review panels. In addition to that, there is staff in place whose job it is to insure that a contractor or grantee getting money from a Federal Government can perform, and they do this ahead of time.

As a program manager, you are trained to do these things after a while. If a proposal comes in and it looks good and has lots of consultants on it but you question the degree to which those people are really involved, you get on the phone and check those things out. It is built into that peer review process.

Whether you can put that kind of language in this legislation, I am not sure. I'm just not sure whether it would be necessary or how you would do it.

Mr. WHITE. Even though there may have been committees that are supposed to check the competency of a company, they have certainly had a lot of trouble in the Pentagon with some of these contracts. Either someone was not doing their job or there was not sufficient mechanism to make that assurance.

Mr. TEMPLEMAN. I would like to repeat Senator Rudman's dichotomy between the procurement and research. I don't know as much about procurement programs as I do research and development programs, where the mechanisms in place, I think, do a pretty good job. I am not sure they do a 100-percent good job. I don't know about the Pentagon.

Mr. WHITE. If you have a certain percentage, like a 3-percent set-aside, the agencies are going to feel compelled to allocate that amount of money, and they may thereby slack off on quality.

Your last suggestion as to a reversion of funds might take care of that. Isn't this a concern, if they have a percentage they have to divert to small business, by George, they are going to find someone, even though the quality may suffer?

Mr. PRAGER. I don't think that is a problem with the agencies we are talking about. An agency can only suffer if any of the programs it funds are not of high quality because it reflects on the Government, on the agency, and on the program manager. There are a lot of incentives to keep that from happening.

Mr. WHITE. Let's turn it around. Why should small business be limited, have a ceiling of 3 percent? If the company is competent and has the wherewithal to perform a research program, why not set up some kind of formula or point system to give them some slight advantage? Because that is what you are doing with the 3 percent. But give them some slight advantage and let them bid on all. Ascertain, of course, in the bids, that they are capable of performing that contract, without setting aside, say, a percentage.

Mr. TEMPLEMAN. We should be sure we understand that the percentage set-aside is not a ceiling—it is a floor. It is a minimum. And any agency can put more than that amount into SBIR programs or any agency can put more into any incentive program.

Most agencies are moving toward the situation in which any organization, whether it is nonprofit or not for profit, or small business or large business, can compete in any Government R. & D. program.

Mr. WHITE. That addresses part of it. The earlier testimony was that some of these companies cannot compete in some contracts against the bid, say of a large company, where there is diversity in the company. Perhaps the way to equalize it would be through a formula of some sort so a small company would have some advantage, or handicap, as it were, to come out even in the bidding so they would have an opportunity to grow stronger as the larger companies grow stronger, with each bid.

Mr. TEMPLEMAN. My sense is, the people, Senator Rudman and others, who backed this bill probably would believe after a few years the small businesses who compete for this money and get this money would be so successful that it would no longer be necessary to have any sort of a set-aside, that the agencies will realize these small businesses are extraordinarily productive and innovative and can compete and do well for the agencies and that the agencies, without needing a set-aside, will cater to small businesses, will be sure small businesses get the information as required and that this kind of a program will not be necessary at all.

Mr. WHITE. Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. White. Mr. Walgren.

Mr. WALGREN. No questions, Mr. Chairman.

Mr. FUQUA. Mr. Glickman.

Mr. GLICKMAN. Two questions, and I apologize for being late.

I would like to ask either of the gentlemen a more philosophical question. I support the basic purposes of both bills. I think our bill is a little better. But the administration has indicated their support of a set-aside for small business. This seems to philosophically indicate that the administration would support set-asides in Federal programs for groups that may not traditionally have access into those programs.

By that I mean not just small business but it may be minority set-asides or any other kind of set-asides that might traditionally—which group might not traditionally have participated.

I wonder if that is the feeling of this administration; they do support set-asides generally?

Mr. **Prager**. No, I think the opposite is true. The administration is opposed to set-asides generally, unless it is absolutely demonstrated that, in a particular case, set-asides are the only approach and that, at least for a period of time, a set-aside could be used to prove a concept. I think that is what we see here.

The President was pursuaded that small businesses were not getting a fair share of the Federal R. & D. funds, that this kind of a set-aside program could test whether or not an expansion of the NSF program to other agencies made sense and would be productive, and that the evaluation built in to the Senate bill would assure that if, after a reasonable length of time, this proved not to be an effective program, it would be discontinued.

Mr. **Glickman**. Are there other groups or areas where you would anticipate the President would also believe that a set-aside for either small business progams or R. & D. programs are appropriated? What you are basically saying to me is that there is no absolute philosophical opposition to set-asides, that you will judge them on a case-by-case basis; is that a correct statement?

Mr. **Prager**. Yes.

Mr. **Glickman**. My second question relates to the issue of universities. You may have answered this question before, but I have received correspondence from many universities who have concerns about this bill. Part of it is parochial. I understand their concern. They have a certain amount of money and don't want to share it, but they see a dramatically declining Federal R. & D. expenditure and they are looking down the 1982 and 1983 budgets and they see enormous reductions in the amount of money the university is getting. I can see it in the NASA budget and the DOE budget. They are saying, "It is terrific to provide set-asides but if you reduce the dollar amount down to nothing, then we end up getting signficantly less than we had before."

Mr. **Prager**. I think that is a legitimate concern. I can't argue with facts right now because the fiscal year 1983 budget is not out yet. However, I believe that universities and other R. & D. performers will feel reasonably good about this administration's commitment to research and development and basic research once the fiscal year 1983 budget is out. However, as you point out, we are in difficult times, inflation is still a difficult problem, and the President is trying to cut back the size and financial commitments of Government programs across the board.

Mr. **Glickman**. It is a tough issue, isn't it?

Mr. **Prager**. It is. The main thing we have been concerned about is the basic science programs. The Senate bill does speak to that in terms of the so-called Schmitt amendment, which limits the degree to which basic science programs can be taxed.

If you look at the structure of most of the R. & D. programs in the Federal Government, you will find that, by the time you get down to the moneys that are actually available for SBIR programs, a very large percentage are those extramural funds available for basic science. I would urge this committee to amend the House bill so that it it conforms to the Senate bill in that it contains some safeguards to assure that basic science is not taxed beyond the 1 percent intended.

Mr. GLICKMAN. Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. Glickman. Mr. Gore.

Mr. GORE. Thank you, Mr. Chairman.

I take it from your testimony, Dr. Prager, that you support the amendment I outlined earlier and said I would introduce.

Mr. PRAGER. Yes, sir, based on your brief reference to them, yes.

Mr. GORE. And that you would support the bill as amended?

Mr. PRAGER. I would have to look at other things too. Some of the agencies will bring up individual things they are concerned about, but basically the amendments you spoke about would make the bill much more acceptable to the administration than it is now.

Mr. GORE. You would not support the bill as it now stands in the absence of those amendments; is that correct?

Mr. PRAGER. That is correct.

Mr. GORE. But you might support it with those amendments?

Mr. PRAGER. In terms of the things I spoke to in my testimony, which are the concerns that the administration has referred to generally, your amendments would appear to address those.

The Department of Defense and NASA, for example, have some concerns about wording in both the House and Senate bills that they would like to see changed. Those are minor things, but I would like to be sure they have an opportunity to be heard on those.

Mr. GORE. If the President supports it, I take it that has an effect on your thinking?

Mr. PRAGER. You were asking about the House bill and I was referring to the House bill.

Mr. GORE. Perhaps I didn't make it clear that the amendments are—generally the thrust of the amendment is to conform the House bill to the Senate bill. Let's assume that the two bills are quite similar after the amendment process. Then, of course, your opinion would be the same as the Presiden's in support of it?

Mr. PRAGER. Yes, I tend to support the President.

Mr. GORE. Dr. Templeman, your views are similar?

Mr. TEMPLEMAN. They are very similar.

Mr. FUQUA. Mr. Lundine.

Mr. LUNDINE. Thank you, Mr. Chairman.

I wanted to ask a question that I hope won't be considered out of order, but I am concerned that we may be taking one step forward and two steps back, and in that regard I would like to ask whether either of your agencies have analyzed the research and development funding cutbacks we have already enacted with regard to their impact on small business versus other participants in research and development activities.

Several articles, including one I have just reviewed from the Christian Science Monitor, suggest that cutbacks in programs such as but not limited to the Department of Energy's solar research, have resulted in termination of research grants to many small firms while larger companies continue to carry out their activities.

While I realize that a lengthy discussion would perhaps be out of order here, I wonder whether you have analyzed the impact in terms specifically of their effect on small business.

Mr. TEMPLEMAN. We have not done a detailed analysis of that. We are concerned with that problem and have done some work around that, but we have not done exactly what you ask.

Mr. PRAGER. I am not aware of any specific analysis.

Mr. LUNDINE. Thank you.

Mr. FLIPPO [presiding]. Dr. Prager, should language intended to provide basic research provide greater protection than currently provided under the Senate bill?

Mr. PRAGER. My reading of the language of the Senate bill is that it is adequate.

Mr. FLIPPO. The Senate bill is adequate?

Mr. PRAGER. Yes.

Mr. FLIPPO. Are there further questions of the witnesses?

If not, gentlemen, thank you very much for joining us today and giving us the benefit of your testimony. I think in the interest of time we would like for the next four witnesses to all come to the witness table at the same time.

STATEMENTS OF DONALD N. LANGENBERG, DEPUTY DIRECTOR, NATIONAL SCIENCE FOUNDATION; STUART J. EVANS, DIRECTOR OF PROCUREMENT, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION; HILARY RAUCH, DIRECTOR OF PROCUREMENT AND ASSISTANCE MANAGEMENT, DEPARTMENT OF ENERGY; HENRY KIRSCHENMANN, DEPUTY ASSISTANT SECRETARY FOR GRANTS AND PROCUREMENT, DEPARTMENT OF HEALTH AND HUMAN SERVICES, ACCOMPANIED BY DR. WILLIAM F. RAUB, ASSOCIATE DIRECTOR FOR EXTRAMURAL RESEARCH AND TRAINING, NIH

Mr. FLIPPO. You might summarize your testimony and specify the differences your agencies have on these matters and emphasize anything unique. Please feel free to summarize. We might start with the National Science Foundation.

Mr. LANGENBERG. Mr. Chairman and members of the committee: I am pleased to present the views of the National Science Foundation on H.R. 4326 and on S. 881. You have my prepared statement. I will try to summarize it.

When we were asked to testify we were asked for our perspectives and experience in establishing the Foundation's own SBIR program, so let me begin with that.

Back in the early seventies when the National Science Foundation's program of research applied to national needs was developing, we found there were a number of small businesses submitting quality proposals, primarily in areas of applied research. At this point, without any legislative pressures, we found that the NSF research awards to small businesses amounted to something on the order of 5 percent of NSF's applied research obligations in fiscal year 1974 and also in 1975.

Beginning in 1976 and through 1981, our Authorization Act required that a specified percentage of funds available for applied research be awarded to small companies. That percentage rose from 7½ percent in fiscal year 1976 to 12½ percent in fiscal year 1978 and remained there through fiscal year 1981. That percentage was equivalent in some years to about 1 percent of NSF's total research budget. Those authorization provisions never specified a particular program structure, or other steps for implementation by NSF. To help meet that target, NSF developed and designed its small business innovation research program, the SBIR program, in 1977.

I will pass quickly over the nature of that program since I assume most of you are generally familiar with it.

Let me mention that it has three phases in the first of which we fund essentially "proof of concept research" at a level of less than or equal to about $30,000 for a period on the order of 6 months. Those who accomplish the phase I research successfully and who come back in with a proposal for phase II (which is peer reviewed, like the phase I research) if successful, may be awarded an amount averaging about $200,000 for performance of the principal portion of the research under the project over a period of up to 2 years. Phase III receives no Federal funding at all. If successful in phase II a small business, having completed phase I and Phase II, will obtain venture capital funding for the conversion of the research results through development into a successful commercial product.

I have attached to my statement for the record a more detailed description of the program along with some examples of some of the significant results from our earlier SBIR awards.

Now let me comment on H.R. 4326 and also the Senate bill 881.

We have some major concerns about the provisions of H.R. 4326. First, the upper level of support in H.R. 4326 may prove too high, we believe, and may lead to some problems of scientific quality; second, the policy and monitoring roles which are specified in that bill for the Small Business Administration we feel would be inappropriate and; third, there are certain details of the program design and proposal review which are specified in 4326 which we think are inadvisable.

Let me speak first to program funding levels, potential impacts and testing of quality.

As several of the previous witnesses have pointed out, according to Congressional Budget Office estimates, under the Senate bill the first through fifth year set-asides would move from approximately $75 million for all agencies up to about $415 million, whereas, under 4326 the set-asides would start at about $200 million and move up to about $1.67 billion. At the moment we estimate that in the two programs of this nature, ours and the Defense Science and Technology Program in the Department of Defense, in fiscal year 1982 there is something on the order of $10 million. Therefore, S. 881 would take that presently allocated fiscal year 1982 figure up by a factor of about 7½ in the first year and a factor of over 41 in the fifth year. In contrast, H.R. 4326 would give a 20-fold increase in the first year and go to greater than 160-fold in the fifth year.

We feel that the substantial rates of increase that 881 would provide are preferable to the ouch larger(increases in 4326. There are several reasons for our belief. First of all, we are still learning how the program works. We consider our program experimental, and we feel it would be risky to mandate very large increases until both we and other agencies coming into such a program, have a better feel for its effectiveness.

We agree with Dr. Prager's statement and we concur with the Senate decision to calculate the percentage set-aside only on the basis of extramural research for the reasons that he stated.

You have asked us for our assessment of the impact of mandated set-asides on the NSF budget. We use for estimating purposes a base of about $900 million for research in the NSF budget. The 1 percent set-aside specified in 881 would give us an allocation of approximately $9 million solely for SBIR and, of course, for the House bill the 3 percent set-aside would be $27 million. At the 1 percent level, therefore, although the amounts for our SBIR program would increase significantly over the presently planned level of about $5 million for 1982, we do not believe that this increase would result in a damaging impact to existing NSF research programs.

At 3 percent, however, significant reductions in research support to presmntly highly productive researchers would be necessary and I would point out that this reduction would be distributed somewhat unevenly over the full range of scientific disciplines which the NSF supports. It is unrealistic to expect that small business research capabilities and interests are evenly distributed over the scientific and engineering disciplines that we support and, therefore, the impact would fall much more heavily on some than on others.

We have some concerns about the policy and monitoring provisions of the House bill. On these, again, we agree with Dr. Prager's statement. The House bill provides that both SBA and OSBT independently monitor the SBIR activities of the agencies. We really see no need for such duplication.

The House bill also provides that SBA shall issue policy directives related to the mission agencies' SBIR programs and also assigns a similar responsibility to OFPP. We believe OMB and OFPP are really more appropriate for two reasons. First, OMB's experience in implementing the Grant and Cooperative Agreement Act of 1977, and OFPP's effort to simplify Government procurement procedures we think gives that office a comparative advantage in drafting directives designed to simplify the SBIR process. Second, because of the broader responsibilities and the relationship to other units of the Executive Office of the President, we believe OMB/OFPP is more likely to see the SBIR programs in the broader context of all Federal research programs.

With respect to program design we note the Senate bill provides for outside peer review "as appropriate," whereas, the House bill appears to require outside peer review for at least phase II proposals. We prefer the greater flexibility of the Senate bill because although we do in fact use the NSF peer review system in both phases of our SBIR sytem, it seems to us that an adaptation of an SBIR program to other agencies will work best if it takes into account those agencies' existing quality control procedures. We do not feel that a slavish adaptation, without modification, of the NSF system is necessarily optimal.

With regard to budget allocations for SBIR, we note the Senate bill includes other provisions to assure that the impact in the required SBIR programs falls equitably on other agency research. We thus endorse the intent behind the clause in that bill which assures that neither basic research nor research in Government-owned, contractor-operated facilities—that is to say, GOCO's—bears an undue share of the SBIR set-aside. NSF is particularly interested in encouraging the continuing vitality of basic research support by all appropriate Federal agencies. The National Science Board is on record as encouraging and expressing an active concern for support of basic research in other agencies and we feel this provision of the Senate bill goes some distance to maintain that.

We have some further concerns about non-SBIR small business goals. Both bills would require agencies to set small business targets apart from those required by the SBIR provisions. We found in our experience both before and after the establishment of our SBIR program that there have always been additional research awards in our programs to small businesses and we would expect this to continue even if the legislation we have under discussion here were to pass. In some recent years these awards, together with SBIR awards, have totalled about 1 percent of the NSF research budget. If S. 881 is enacted the amounts allocated at NSF for small business innovation research will nearly double. We can envision some circumstances, however, in which an agency might find it advantageous to encourage utilization of research results by meeting its entire small business R. & D. goal through the SBIR program. We feel as long as an agency meets at least its statutory minimum set-aside for SBIR projects that the legislation should allow flexibility for meeting additional goals through additional SBIR projects or outside such a program format.

There is an additional point concerning non-SBIR small business goals that is present in both bills. Both bills appear to require that annual total small business R. & D. percentage goals for an agency be not less than the percentage of the agency's R. & D. awards to small business for R. & D. in the preceding fiscal year. The wording suggests that the SBIR award would be counted in estabishing the floor for computation but could not be counted toward meeting the goals. This appears to build in an escalator which assures that the total small business goals for an agency would represent a larger and larger proportion of the R. & D. budget each year. We find no rationale related to the scientific strength and progress of the Nation that justifies such guarantees of unlimited growth favoring one particular group of researchers. That problem could be remedied relatively easily by excluding SBIR awards from the computation of the small business goal or, alternatively, including both types, both SBIR and non-SBIR, toward establishing and fulfilling the goal. Either way it would give consistency.

Finally, we endorse the provision of S. 881 that requires the Comptroller General to evaluate the longer term significance of the research conducted under the act, but we think that 2 years following enactment is too soon. We would suggest from our experience that at about the fourth year onward an evaluation would be appropriate. Further, we recommend that such an evaluation ought to include all research under the SBIR Act, not solely basic research as now provided. We find no reason to exclude any of the research, whether it be basic or applied, leaving aside the rather difficut question of deciding whether a particular piece of research is basic or applied.

In summary, then, we are concerned about some aspects of H.R. 4326 which differ in several respects from the Senate bill. For the reasons we have discussed above, the National Science Foundation prefers S. 881.

That concludes my statement, Mr. Chairman.

I would be pleased to respond to any questions.

[The prepared statement of Dr. Langenberg follows:]

Statement of

DR. DONALD N. LANGENBERG

Deputy Director, National Science Foundation
Before The
Committee on Science and Technology
House of Representatives
January 26, 1982

Mr. Chairman and Members of the Committee:

I am pleased to present the views of the National Science Foundation on H.R. 4326, the Small Business Innovation Development Act, and on S. 881, which has passed the Senate with the support of the Administration. The two bills have parallel objectives. However, we prefer the means by which S. 881 would attain those objectives, and will explain why later in this testimony.

In your January 6 letter inviting NSF's testimony, you asked also for our perspectives and experience in establishing NSF's SBIR program, its relationship to the Foundation's role and charter, and its relationship to other programs at the NSF. I shall first discuss our SBIR program, and then comment on the proposed legislation.

NSF's Small Business Innovation Research Program

NSF's Small Business Innovation Research program is the combined result of a trend that had begun in NSF, and Congressional guidance initiated in NSF's authorization subcommittee in the Senate. As NSF's program of Research Applied to National Needs developed in the early 1970's, a significant number of small businesses were submitting quality proposals in areas of applied research. Without any legislative pressures, NSF research awards to small businesses amounted to 5.3 percent of NSF applied research obligations in FY 1974, and 5.2 percent in FY 1975.

From FY 1976 through FY 1981, NSF's authorization acts required that a specified percent of funds available for applied research be awarded to small companies. The required percents grew from 7.5 percent in FY 76, to 10 percent in FY 77, to 12.5 percent from FY 78 through FY 1981. This was equivalent in some years to about one percent of NSF's total research budget. Those legislative provisions have never specified the program structure or other steps by NSF for implementation.

To help meet the target required by our authorization, NSF initiated its Small Business Innovation Research (SBIR) program in 1977 to stimulate quality proposals in NSF program areas. To reach high caliber small firms and to achieve other objectives, NSF designed a special three-phased program with incentives of particular interest to small science-based and high-technology firms. NSF issues a solicitation that identifies 20 to 25 areas of research that have been selected by NSF program managers. The topical areas are described so as to encourage a range of ideas. The solicitation is designed to enable efficient handling of the large number of proposals received. The format is standardized and Phase I proposals are limited to 20 pages.

Phase I supports research projects of up to $30,000 for six months on important scientific or engineering problems or opportunities of interest to NSF research programs. Those projects found most promising after phase I receive phase II awards which have averaged

$200,000 for 1 - 2 years. This is the principal research project. Phase III is to pursue commercial applications where possible from the NSF research supported in phases I and II and is funded entirely with private capital.

Some 700 proposals were received in our 1981 solicitation. These resulted in 85 phase I awards. Since only phase I grantees can submit phase II proposals, the number of standard length phase II proposals is sharply reduced from the initial 700 to an estimated 70-80, distributed to 20-25 members of the NSF professional staff. This normally results in 25-35 Phase II awards.

NSF views its SBIR program as experimental in nature. It is related to NSF program purposes, and --since it operates on a modest scale in terms of NSF's overall distribution of funds among many research programs--the program has not had a significant adverse effect on funds available for other research performers. The program is well received in the small business research community, and by those in the Congress who have pressed the NSF to increase research opportunities for small companies. We are pleased with initial results from the program and have been planning for its continuation with or without the legislation under consideration.

Attached to this statement is a more detailed description of the program, together with some examples of significant results from some of the SBIR awards.

Comments on H.R. 4326 and S. 881

The National Science Foundation supports Senate Bill 881. NSF's major concerns with the provisions of H.R. 4326 are:

- the upper level of support that H.R. 4326 would eventually require for the Small Business Innovation Research Program (SBIR), that may prove too high and lead to problems of scientific quality;

- the policy and monitoring roles specified for the Small Business Administration would be inappropriate;

- certain details of program design and proposal review specified in H.R. 4326 appear inadvisable.

Program Funding Levels, Potential Impacts, Testing of Quality

The NSF has serious reservations about the eventual level of 3% that would be reached under H.R. 4326. In the reports that accompany each of the bills, the Congressional Budget Office estimates that under S. 881, the first year SBIR set-aside for all agencies would total $75 million in the first year, and $415 million by the fifth year. Under the different provisions and higher percents that would be levied by H.R. 4326, the first-year SBIR set-aside would total $200 million, and the fifth year set-aside would total $1.665 billion.

These estimates compare with an estimated $10 million in FY 82 for small business programs of this nature--$5 million for SBIR by NSF and $5 million for the Defense Science and Technology (DESAT) program of the Department of Defense.

S. 881 would increase the presently allocated FY 82 figures by a factor of 7.5 in the first year, and by a factor over 41 in the fifth year. Under H.R. 4326, the funds for SBIR programs would start with a twentyfold increase in the first year increasing one hundred sixtyfold by the fifth year. We suggest that the very substantial rates of increase that S. 881 would provide are preferable to the much larger increases provided by H.R. 4326 for the following reasons.

We are still learning how the program works. The 1% specified by S. 881 is high enough to provide a fair test of the concept. Until the potential of the small business research community has been tested in terms of a steady flow of high quality proposals at the 1% level, it is risky to mandate an increase first to 2% and then to 3%. While there probably are enough research performing companies to absorb the funds that would be available at the 3% level, it is questionable that the quality of the research could be maintained with so rapid an increase in the funds available.

We concur also with the Senate's decision to calculate the percentage set-aside only on the basis of extramural research. Excluding intramural research (which, by the way, will not directly affect the National Science Foundation) also permits a more realistic assessment of the impact of the required set-aside.

It is unlikely that major amounts of research now done intramurally can be shifted to small business. As a result, any percentage set-aside calculated on an agency's intramural research would have to be met by setting aside a larger amount of the rest of the research budget. Many considerations enter into decisions to perform research in-house. These range from the time and expense it has taken to assemble and retain uniquely qualified special purpose research teams and facilities, the loss of focus and accountability problems that can result when certain research programs are fragmented and diffused, to specific congressional guidance requiring establishment of special purpose Federal facilities.

Potential Impact on NSF Budget

You have asked for our assessment of the impact of the mandated set-asides on the NSF budget, including the impact on basic research. Using a base of $900 million for estimating purposes only, at 1 percent, as specified by S. 881, NSF would be required to allocate $9 million solely for SBIR. At 3 percent, which would be required by H.R. 4326, NSF's allocation solely for SBIR would amount to $27 million.

At the 1 percent level, though the amount for SBIR would increase significantly over the presently planned level of $5 million for FY 1982, the increase would not result in damaging impact to existing NSF research programs. By selection of topical areas in which proposals are invited, NSF can distribute the potential impact to areas in which small research companies can have the best opportunities to perform high quality research. We would not foresee any severe impact on other communities of research performers, or on basic research. Our experience to date indicates that small research companies are more often interested in seeking support for applied research than for basic research.

At the 3 percent, or $27 million level, NSF foresees a need to set-aside sufficient amounts of funds that would result in significant reductions in research support to presently highly productive researchers. Even though the same principle of distribution of impact through choice of topics would apply as for 1 percent, at 3 percent the amounts required would have potentially serious consequences since it is unrealistic to expect to find small business research capabilities and interest reasonably evenly distributed over the scientific and engineering disciplines supported by NSF. There will be a concentration of interest in particular disciplines and under the statutory mandate there will be very much heavier pressure than 3 percent in some programs. While it is not possible to forecast with any accuracy, we anticipate that the concentration of proposals in basic research areas would be a relatively small proportion of the total.

Policy and Monitoring

Although the two bills are broadly similar in the roles assigned to the Small Business Administration, the Office of Science and Technology Policy, and the Office of Federal Procurement Policy, there are differences that we consider significant.

H.R. 4326 provides that both SBA and OSTP independently survey and monitor the SBIR activities of the participating federal agencies. We see no need for such duplication. Because of its specific responsibilities for the balance of federal science programs, its scientific expertise, and its role as advisor to the President on science policy, we believe the OSTP better qualified to perform this task.

Section 4(j) of H.R. 4326 provides that SBA, after consultation with other agencies, shall issue policy directives related to the SBIR programs of the mission agencies. Section 3(f) of S. 881 assigns a similar responsibility to the OFPP. We think the OMB/OFPP is the more appropriate for two reasons. First, OMB's experience in implementing the Grant and Cooperative Agreements Act of 1977, and OFPP's efforts to simplify government procedures give OMB/OFPP a comparative advantage in drafting directives designed to simplify the SBIR process. Second, because the broader responsibilities and relationship to other units of the Executive Office of the President, the OMB/OFPP seems more likely to see the SBIR programs in the broader context of overall federal research programs.

Program Design

Peer Review: In comparing the provisions of the two bills in this general area, while S. 881 provides for outside peer review "as appropriate," H.R. 4326 appears to require outside peer review for at least Phase II proposals. We prefer the greater flexibility of S. 881 since the imposition of unfamiliar research review methods may cause serious management problems for some agencies and possibly for small businesses as well. Policy guidance on standardization should minimize departures from the methods and procedures evolved by the various agencies to suit their organizational structures and research purposes. The same quality controls that apply to an agency's usual research activities--whether or not these include peer review--should apply to the SBIR as well.

Budget Allocations for SBIR: In addition to its exclusion of intramural research, the Senate bill includes other provisions to assure that the impact of the required SBIR program falls equitably on other agency research. We thus endorse the intent behind the clause in section 3 of S. 881 to assure that neither basic research nor research in government-owned, contractor-operated facilities bears an undue share of the total SBIR set-aside. The NSF is particularly interested in encouraging the continuing vitality of basic research support by all appropriate Federal agencies. The National Science Board has long expressed its active concern for the strong support of basic research by the mission agencies. However, earlier this year, organizational distinctions between basic and applied research at NSF were eliminated and applied research functions, formerly located in a separate Directorate, were redistributed among all research Directorates. NSF research funds in its budget are not now separately earmarked as available for obligation for basic research, or for any other categories mentioned in the clause in Section 3. We do have a procedure to track actual research obligations according to whether they are in support of basic or applied. When final actions are taken on proposals and grant awards are made, program officials determine the basic/applied nature of the project, even assigning proportionate percentage figures where the research being supported is a mixture of both. Therefore, the clause will be difficult to apply to NSF. For forecasting purposes NSF probably will use the estimated distribution of funds provided to our Division of Science Resources Studies for publication in Federal Funds for Research and Development.

Non-SBIR Small Business Goals

Both bills would require agencies to set small business targets apart from those required by the SBIR provisions. The NSF's experience, both before and since the establishment of its SBIR program, is that there have always been additional research awards to small businesses and we would expect this to continue even if the legislation under discussion were to pass. In some recent years, these, together with SBIR, have totalled 1% of the NSF research budget. If the levels in S. 881 are enacted, the amounts allocated at NSF for SBIR will nearly double. However, we can visualize some circumstances in which an agency might find it advantageous to encourage utilization of research results by meeting its entire small business R and D goal through the SBIR program. We recommend that, so long as an agency meets at least its statutory minimum set-aside for SBIR projects, the legislation allow flexibility for meeting additional goals through additional SBIR projects or outside such a program format.

An additional point concerning non-SBIR small business goals is present in both bills. The bills appear to require that annual total small business R and D percentage goals for an agency be not less than the percentage of the agency's R&D awards to small business for R and D in the preceding fiscal year. The wording suggests that SBIR awards would be counted in establishing the floor for computation but could not be counted toward meeting the goals. This appears to assure that the total small business goal for an agency would represent a larger proportion of the R and D budget each year. We find no rationale related to the scientific strength and progress of the Nation that justifies such guarantees of unlimited growth favoring one group of researchers. This problem could be remedied by excluding SBIR awards from the computation of the small business goal for next year's non-SBIR small business awards. Alternatively, both types could be counted in establishing and fulfilling the goal. Either way would achieve consistency.

Long Term Program Evaluation

We endorse the provision of S. 881 that requires the Comptroller General to evaluate the longer term significance of the research conducted under the Act. However, two years following enactment is too soon since projects would not have completed Phase II at that point. NSF's experience indicates that such evaluation would be much more useful and valid from about the fourth year onward. Further, we recommend that such evaluation include all research under the SBIR Act, not solely basic research as now provided in Section 3,(g). We find no reason to exclude from evaluation any of the research supported through the SBIR programs. We suggest that agencies be required to retain copies of proposals received, the review record, and final reports for funded proposals so as to enable later program evaluation.

Summary Comment

H.R. 4326 differs in several aspects from S. 881 which was passed by the Senate. The National Science Foundation prefers S. 881 for the reasons discussed above.

We welcome the examination of these bills by the oversight committees of each of the major agencies affected by this legislation. Since the authorizing committees work with such care to guide and help develop the research and R and D programs of the agencies over which they have jurisdiction, it is important they review carefully and concur in any bill which would specify program structure, or reserve a portion of the program resources for designated research performers.

I will be glad to respond to your questions, Mr. Chairman.

ATTACHMENT

NSF SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Background: The NSF Small Business Innovation Research or SBIR program was initiated in 1977 to stimulate quality proposals in NSF program areas to meet the Congressional requirement at that time that 10 percent of the NSF applied research budget be spent on research conducted by small business firms. This was equivalent to about one percent of the NSF budget. To reach high caliber small firms and to achieve other objectives, NSF designed a special three-phased program with incentives of particular interest to small science-based and high-technology firms.

Program Objectives:

- To increase the opportunity for small science and high technology firms to participate in NSF research.
- To support quality research of interest to NSF with emphasis on areas that have potential application in industry.
- To couple NSF research to follow-on private venture capital or other support to pursue commercial applications from the NSF funded research project.
- To increase technological innovation from government funded research.
- To improve the economic and social return on investment from Federal research.

Program Description: Phase I supports research proposals of up to $30,000 for six months on important scientific or engineering problems or opportunities of interest to NSF. Those projects found most promising after phase I receive phase II awards which have averaged $200,000 for 1 - 2 years. This is the principal research project. Phase III is to pursue commercial applications where possible from the NSF research supported in phases I and II and is funded entirely with private capital.

Design: The program invites proposals from small firms with strong research capabilities in 15-25 specific advanced research areas of interest to NSF. A standard format is used to simplify the process. Phase I proposals are also limited to 20 pages to reduce the investment in preparation to the proposer and the time required for review. NSF specialists in each topic serve as topic managers. Peer reviews are obtained on the proposals, usually from university or government scientists or engineers, and occasionally the private sector.

The program is unique in that it provides an incentive for the grantee to pursue commercial applications from the SBIR research. Proposers are encouraged to obtain a commitment for follow-on funding from the private sector for phase III which is the product or process development phase. Government funds are spent solely on research of interest to NSF in phases I and II; private funds pursue commercial objectives in phase III. The commitments are treated as an extra point-of-merit in the evaluation process where proposals are otherwise considered of approximately equal technical merit.

The commitments are obtained from a third party, normally a venture capital or larger industrial firm, for an amount at least equal to the funding requested from NSF for phase II research. The use of the third party is to increase objectivity and to use private firms to evaluate the potential market, management and future financial requirements for the commercial application. Government is not involved in these evaluations but solely in considering any follow-on funding commitment presented. The approach provides an incentive for the conversion of the NSF research into industrial applications and technological innovation at little or no additional cost to government.

Current Status: Four solicitations have been conducted to date - in 1977, 1979, 1980 and 1981. The 1977 solicitation has completed phase II, 1979 is in phase II, 1980 made some phase II awards with more planned this year and 1981 is in phase I. A fifth solicitation is planned for January 1982. The program design anticipates that approximately one-half of those projects found most promising in phase I will be funded in phase II.

Results to Date: The program is highly competitive with over 2000 proposals received and only 284 awards made to date. Proposals have been received from firms in 49 of the 50 states plus the District of Columbia and awards have been made to firms in 36 states and the District as follows:

	Solicitation				
	1977	1979	1980	1981	Est. 1982
Phase I Proposals	329	408	530	696	700
Phase I Awards	42	54	62	85	50 - 80
Phase II Awards	21	13	20 - 30 (planned)	30 - 40 (planned)	25 - 40

Phase II awards since 1977 have been reduced due to limited available funding.

In addition to the SBIR program supporting advanced research in a wide range of program areas, the 21 phase II grantees in the 1977 solicitation have received $23 million in follow-on funding to date. These 21 firms also have more than doubled their employment. NSF funding in phases I and II of the 1977 solicitation totaled $5.3 million. There have been new firms started as a result of the program and some 15 inventions reported. A number of new products and processes are under development and one has reached the market place. An increasing number of the industrial and venture capital firms are showing interest in the program as the SBIR topics have become more industrially relevant.

Coordination: NSF coordinates and cooperates with most Federal agencies with significant R&D budgets. Other agency and university scientists and engineers often review SBIR proposals as do some private sector people. The NSF staff has assisted DOD with its similar Small Business Advanced Technology program and discussed the program with other agencies. The DOD program anticipates 150 phase I awards of up to $50,000 and up to $500,000 in phase II with the opportunity for follow-on production contracts in DOD as well as private sector commercialization in phase III.

Proposers are encouraged to cooperate with university resources such as through consulting arrangements, sub-contracts and the use of special facilities on occasion. Most grantees have done so, particularly in utilizing university scientists and engineers as consultants.

NSF SMALL BUSINESS INNOVATION RESEARCH PROGRAM

SIGNIFICANT RESULTS

- 284 awards funded to date on NSF research.
- Laser optics research was funded with OMEX, a small electronics firm in Santa Clara, Cal. for $25,000 for phase I in 1977 and $147,000 for phase II in 1978. The firm then received $5 million in phase III from the Heizer Corporation, a Chicago SBIC, for application of the research to a new field of electronic filing based upon the potential storage density. OMEX has since signed a $4 million contract to produce the equipment for the nation's largest title insurance company in Los Angeles.
- Genetics research was supported in 1977 with Collaborative Research of Waltham, Mass., to enhance animal protein production. This was well before the Supreme Court decision and subsequent availability of venture capital. It was the company's first genetics research. NSF funding was $25,000 for phase I and $235,000 in phase II. Dow Chemical provided $7 million of follow-on contract funding to pursue technology of interest to Dow and more recently invested an additional $5 million for a 5 percent equity in the company.
- To increase productivity, NSF funded Advanced Mechanical Technology of Newton, Mass. for advanced research to implant an isotope on the cutting edge of machine tools for automatic production processes for $25,000 in phase I and $186,000 in phase II. GE, Ford, Chrysler and Raytheon were all interested as were the Japanese. Although no radiation problems are anticipated, the problem of obtaining the approval of the NRC, OSHA and EPA will take two years. Currently a fifth major U.S. industrial firm with plans for a new partially automated factory is interested.
- Research on measuring metal fracture toughness was funded with Terra Tek of Salt Lake City for $25,000 in phase I and $220,000 in phase II. The company has now built an instrument to measure the fracture toughness of drilling bits for mining and petroleum needs which is being sold world-wide. They are now developing a full line of instruments to meet a wide range of applications in many different kinds of metals.
- Soil and Land Use Technology, Inc. of Columbia, MD, received awards to determine the feasibility of introducing foreign food crops into the U.S. which were better adapted to environmental stress such as arid, wet or saline conditions. Their study has become widely known and they have recently received $130,000 from the American Newspaper Publishers Association to pursue kenaf, a hemp-like crop which grows in wet areas, as a possible source of newsprint.
- Three earthquake engineering firms in the Los Angeles area that received grants in phase I formed ABK, a joint-venture, to conduct phase II using the unique capabilities of each firm. The study is probably the most comprehensive and best known to date in the important area of strengthening existing non-reinforced masonry buildings. The results are being implemented in Los Angeles building codes, studied by other cities and states. Professional organizations are using the study to develop revisions to model building codes which will have world-wide application.

RESEARCH OPPORTUNITIES

IN

1982 SBIR PROGRAM

The National Science Foundation invites advanced research proposals in 24 scientific and technological areas for its 1982 Small Business* Innovation Research (SBIR) program. New areas of interest include immunology and microcarriers, information technology, applied mathematics, atmospheric research, heat transfer, chemistry, and water treatment.

Eighty-five Phase I awards of up to $30,000 are anticipated under the three-phase program. Phase II awards, which have averaged $200,000 to date, will be made to firms with projects that show the most promise after Phase I. Phase I proposals are restricted to 20 pages. Commercial patent rights are normally available to the small business awardees.

The program supports high-risk advanced research on important scientific and engineering problems or opportunities which could lead to significant public benefit if the research is successful.

A second important goal of the SBIR program is technological innovation through the conversion of NSF supported research into industrial applications. To accomplish this, the program's design encourages the small firm to pursue commercial applications from the NSF research supported in Phases I and II, with private follow-on capital. If successful, this may significantly increase the economic and social benefits to the Nation from Federally funded research.

RESEARCH TOPICS

Program areas of interest in 1982 are:

1. Materials Research
2. Alternative Biological Resources
3. Marine and Freshwater Resources
4. Mineral Resources
5. Scientific and Industrial Measurement
6. Microelectronics
7. Computer Science and Applied Mathematics
8. Computer Engineering
9. Robotics and Control
10. Information Technology
11. Communications and Systems
12. Science and Technology to Aid the Handicapped
13. Advanced Manufacturing Processes
14. Advanced Chemical Processes
15. Chemistry
16. Biochemical Engineering
17. Immunological and Microcarrier Techniques
18. Food Process Engineering
19. Water Treatment Research
20. Atmospheric Technology
21. Radiation Processing and Control
22. Heat Transfer
23. Light Machinery and Components Research
24. Tunneling, Drilling, Excavation, and Dredging

*500 or less employees in all affiliated firms.

PROGRAM DESCRIPTION

Phases I and II fund advanced research in any of the above 24 topics each of which includes a number of sub-topics. In Phase I, proposals are funded for up to $30,000 (including fee) for six months to determine, as much as possible within these constraints, whether the research idea appears technically feasible prior to further government investment. Phase II is the principal research project and provides research support up to and including a laboratory prototype, where necessary. NSF does not fund product or process development.

The program is unique in that it provides an incentive for the grantee to pursue commercial applications from the NSF research base. Phase I grantees are encouraged to obtain a commitment for Phase III follow-on funding from the private sector prior to NSF's funding of Phase II. Phase III is the product or process development phase. Private funds pursue potential commercial applications in Phase III. Government funds are spent solely on research of interest to NSF in Phases I and II.

Awards are based upon the merits of the research proposed. In the Phase II evaluation process, where proposals are otherwise considered of approximately equal research merit, commitments for Phase III funding are treated as an extra point of merit. The commitment may be contingent upon the firm receiving a Phase II award and Phase II research achieving certain technical objectives mutually agreed upon between the party providing the commitment (usually a venture capital or larger industrial firm) and the grantee.

OBJECTIVES

The Small Business Innovation Research program is designed to:

- Increase the opportunity for small science and high technology firms to participate in NSF research.
- Support high quality and cutting-edge research of interest to NSF in areas that have potential application to industry.
- Couple NSF research to follow-on private funding to pursue commercial applications, where appropriate.
- Increase technological innovation and the resulting economic and social return on investment from Federal research.

The SBIR program often supports important advanced research which is too long term or high risk to be financed in small firms with private funds. If successful, the research may reduce the risk to a level which will justify private investment and identify potential industrial applications SBIR research not only adds to scientific and engineering knowledge but also may provide the basis for a new generation of products or processes, and the resulting economic growth, job creation and other related benefits.

TO OBTAIN A COPY OF THE SOLICITATION

NSF is particularly interested in small science or high technology firms with strong research capabilities in science or engineering. It also encourages participants to utilize university scientists and engineers as consultants or collaborators. To be competitive in the program, proposals should not be prepared without the instructions and detailed topic descriptions provided in the Program Solicitation NSF 81-85A.

If your firm is on the NSF Small Business mailing list, it will receive a copy of Program Solicitation NSF 81-85A. If your firm is not on this mailing list a copy may be obtained from the:

Forms and Publications Office, Room 235
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

The deadline for receipt of SBIR proposals at NSF is April 1, 1982.

Mr. FLIPPO. We will next hear from Mr. Evans of NASA. We are glad to have you with us.

Mr. EVANS. In our letter dated January 22, 1982, we provided the committee with all previous testimony on this subject matter and today I shan't repeat anything we covered in that letter.

NASA has repeatedly endorsed the objectives of these bills and their predecessors, and does so again today. Our concerns, in the past, have dealt with the manner in which these objectives would be attained and most of those concerns are still present in H.R. 4326. We do endorse S. 881 as supported by the President in his letter to Senator Rudman on October 6, 1981.

However, when it comes to certain recommendations, in the interest of time, I would say at the outset that I totally agree with what the National Science Foundation (NSF) has said with respect to changes they would recommend.

The House Committee Report 97-349 further addresses the purposes by stating, "It is aimed at stimulating innovation in general and at stimulating the technologically and innovatively oriented small business sector." These purposes would be accomplished through "funding agreements" under the various agency Small Business Innovation (SBIR) programs. The bill defines "funding agreement" in section 4(e)(2) as meaning:

> Any contract, grant or cooperative agreement entered into between any Federal agency and any small business for the performance of experimental, developmental or research work funded in whole or in part by the Federal Government.

Our interpretation of its stimulation purposes suggests that, pursuant to Public Law 95-224, the grant instrument is the most likely vehicle for this purpose under that statute.

The legislative history of the bill also makes clear the SBIR program as embodied in H.R. 4326 is based on the current NSF program. Since the NSF has likewise determined the grant process to be the appropriate instrument for its current SBIR program, we likewise conclude that what is envisioned in H.R. 4326 is fundamentally an assistance program to support research consistent with the NSF program. It appears that efforts of the nature proposed in the first phase under H.R. 4326 would most appropriately fall within the authorizations of this committee for aeronautical, space research and technology, physics and science areas of space science and space applications under which most of NASA's supporting research and technology efforts are conducted. The direction of the committee on the application of the funds authorized taken in conjunction with the limitations of the Schmitt amendment and the sizable set-aside amounts of H.R. 4326 may require significant budget adjustment for us. We would have to look to this committee for guidance in the matter of those adjustments.

You also requested our views regarding the potential of this legislation for increasing small business participation in NASA's research and development activities. We previously stated that small business currently participates in our research and development activities to the extent of a quarter of a billion dollars annually through direct contracts with NASA. Additionally, NASA prime contractors subcontract some $132 million in research and development annually with the small business community. This procurement is in direct support of authorized programs and provides a direct benefit to the Government. Our small business efforts totaled $409 million in 1981 and was contracted directly with small businesses and $479.9 million was subcontracted by our prime contractors to small businesses. That is a total of some $884 million, or roughly 20 percent, of our total procurement program.

The weight of our experience with small business leads us to have some reservations as to the potential inherent in the magnitude of H.R. 4326 for increasing small business participation in NASA's research and development activities and to derive research benefits to the agency commensurate with the expenditures the bill would direct. These reservations fall into several categories. First, the Congressional Budget Office estimates of the appropriations set-asides which would be required, particularly under H.R. 4326, graphically portray the 5-year order of magnitude expansion envisioned for this concept.

The SBIR program is a new program essentially overlaid on top of the existing agency small business programs to the magnitude previously outlined. It appears to be conducted in a different manner yet would presumably tap the same small business research community in our case. Our requirements wouldn't change. Our interests wouldn't change, and so we would be going to the sources we know. When we consider the size of the funding actions in each program phase as contemplated by the House Small Business Committee, the amount of proposal activity and resulting funding actions necessary to execute such a set-aside mandate cannot, in our view but impact existing small business programs, and in a way difficult for us to see at this point in time. We firmly believe that the more modest yet substantial rates of set-aside embodied in S. 881 would provide for a more orderly development and application of such a concept across all the agencies.

Of the programs it may impact, and one of some concern to us, is our research and technology objectives and operating plans. We annually acquaint small business with this program and our activities through the publication of that research and technology operating plan. It has been a longstanding policy to encourage the participation of small business firms in our work through the medium of unsolicited proposals. Normally, year after year, one out of every four unsolicited proposals from small business is accepted. On the other hand, small business reaps the benefits of NASA's operations through several parts of the technology utilization program with which I know this committee is familiar.

Senator Rudman addressed the question of absorption and the rate of absorption in terms of funding, and we have in a sense the same concern. We are familiar with the sources with whom we contract with at this time for our requirements. It is to that group that we would go for requirements that would arise under the SBIR program and we have no knowledge at this point of the extent to which capability exists out there to absorb the type of funding that H.R. 4326, particularly in the fourth year, would envision. The Senate bill, however, at one third the scale of H.R. 4326 can well be accommodated and it is not expected to present these absorption difficulties.

Finally you asked us for recommendations that we might make with respect to the House bill. One, as previous witnesses have stated and we certainly endorse, in S. 881, is the exclusion of inhouse research from that portion to which the set-aside would apply. In our case this is predominantly the research program and management appropriation, 80 to 90 percent of which goes to support in-house activities such as travel, utilities, salaries, and the like. We see very little flexibility within that appropriation for contracted research of the character embodied in these bills.

As the NSF has stated, we feel in terms of structuring this program, that the Office of Federal Procurement Policy and the Office of Science and Technology Policy are substantially better equipped to deal with the character of the program. It is a procurement and research and development program. Those two offices, in our judgment, have the background, experience, and the staffing to cope with a program of this nature, as opposed to the Small Business Administration, which was not established for something of this character.

The Senate bill also includes a provision for the GAO to examine this program within a period of 2 years. As the NSF has likewise stated, we believe that period is perhaps too short when one looks at the cycle for this SBIR. Our recommendation would be perhaps to review it after 5 years as opposed to 2.

Mr. Chairman, that summarizes my statement, and I would be happy to answer any questions.

[The prepared statement of Mr. Evans follows:]

HOLD FOR RELEASE UNTIL
PRESENTED BY WITNESS

STATEMENT OF
STUART J. EVANS
DIRECTOR OF PROCUREMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BEFORE
THE COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

JANUARY 26, 1982

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

WE APPRECIATE THE OPPORTUNITY TO APPEAR BEFORE YOU TODAY AND CONTRIBUTE TO YOUR REVIEW OF H.R. 4326, THE SMALL BUSINESS INNOVATION DEVELOPMENT ACT, AS REPORTED BY THE HOUSE COMMITTEE ON SMALL BUSINESS ON NOVEMBER 20, 1981. YOU HAVE FURTHER INVITED US TO COMMENT UPON S. 881, THE SENATE COUNTERPART MEASURE, PASSED ON DECEMBER 8, 1981, AND WE SHALL BE PLEASED TO DO SO.

BY LETTER OF JANUARY 22, 1982, WE HAVE PROVIDED THE COMMITTEE WITH ALL PREVIOUS NASA TESTIMONY ON THE SUBJECT MATTER OF THESE BILLS AND COMMENTED GENERALLY UPON THE IMPACT SUCH BILLS WILL HAVE UPON THE AGENCY. ACCORDINGLY, TODAY, WE WILL PRIMARILY ADDRESS THOSE MATTERS WHICH YOUR INVITATION OF JANUARY 6, 1982, CONTAINED AND ATTEMPT NOT TO DUPLICATE OUR PREVIOUS COMMENTS TO YOU.

NASA HAS REPEATEDLY ENDORSED THE OBJECTIVES OF THESE BILLS, AND THEIR PREDECESSORS, AND DOES SO AGAIN TODAY. OUR CONCERNS, IN THE PAST, HAVE DEALT WITH THE MANNER THESE OBJECTIVES WOULD BE ATTAINED AND MOST OF THOSE CONCERNS ARE STILL PRESENT IN H.R.

4326. WE DO ENDORSE S. 881 AS SUPPORTED BY THE PRESIDENT IN HIS LETTER TO SENATOR RUDMAN ON OCTOBER 6, 1981.

BOTH BILLS WOULD CREATE A MAJOR NEW SMALL BUSINESS PROGRAM, OF AN EXPANDING NATURE ON A CONTINUING BASIS. NEITHER BILL AUTHORIZES ANY APPROPRIATIONS FOR THIS PROGRAM EXECUTION BUT RATHER DIRECTS THE REALLOCATION OF FUNDS CURRENTLY AUTHORIZED/APPROPRIATED FOR OTHER PURPOSES TO BE USED EXCLUSIVELY FOR THIS SBIR PROGRAM. BOTH BILLS STIPULATE THAT CURRENT APPROPRIATIONS REALLOCATED IN THIS MANNER SHALL BE USED ONLY FOR THE SBIR PROGRAM. HOWEVER, BOTH BILLS INTEND THAT THE FUNDS SHALL BE EXPENDED CONSISTENT WITH THE AGENCY'S ESTABLISHED R&D MISSION.

WE BELIEVE THAT THE REVIEW OF H.R. 4326 BEING UNDERTAKEN IS PARTICULARLY RELEVANT SINCE, AS NASA'S AUTHORIZING COMMITTEE, YOU HAVE A UNIQUE INSIGHT INTO THE AGENCY'S MISSION AND PROGRAMS WHICH, AFTER DUE AND DELIBERATE CARE, YOU AUTHORIZE EACH YEAR. IN OUR JUDGMENT, THIS COMMITTEE IS IN AN OUTSTANDING POSITION TO ASSESS THE IMPACT UPON NASA OF THE BROAD LEVY H.R. 4326 WOULD IMPOSE ON THE AERONAUTICS AND SPACE AUTHORIZATIONS YOU RECOMMEND, AND TO WEIGH THE VALUE OF SUCH A LEVY ALONGSIDE THE SUBSTANTIAL PROGRAMMATIC AUSTERITY INHERENT IN THE ADMINISTRATION'S INITIATIVES FOR REDUCING THE FEDERAL BUDGET. WE FURTHER BELIEVE THAT THIS COMMITTEE MAY WISH TO CONSIDER THE MAGNITUDE OF THE

PROGRAM PROPOSED BY H.R. 4326 IN TERMS OF POTENTIAL CHANGES IT MAY MAKE IN THE WAY NASA CARRIES OUT ITS MISSION.

TURNING TO THE SPECIFIC MATTERS YOU REQUESTED US TO ADDRESS, I SHALL ENDEAVOR TO RESPOND TO THEM IN THE SAME ORDER IN WHICH THEY WERE POSED.

SECTION 2b OF THE BILL STATES ITS PURPOSES AS:

"(1) TO SIMULATE TECHNOLOGICAL INNOVATION;

(2) TO USE SMALL BUSINESSES TO MEET FEDERAL RESEARCH AND DEVELOPMENT NEEDS; AND

(3) TO INCREASE PRIVATE SECTOR COMMERCIALIZATION INNOVATIONS DERIVED FROM FEDERAL RESEARCH AND DEVELOPMENT."

THE HOUSE COMMITTEE REPORT 97-349 FURTHER ADDRESSES THE PURPOSES BY STATING "IT IS AIMED AT STIMULATING INNOVATION IN GENERAL AND AT STIMULATING THE TECHNOLOGICALLY AND INNOVATIVELY ORIENTED SMALL BUSINESS SECTOR." THESE PURPOSES WOULD BE ACCOMPLISHED THROUGH "FUNDING AGREEMENTS" UNDER THE VARIOUS AGENCY SBIR PROGRAMS. WHILE THE BILL DEFINES "FUNDING AGREEMENT" IN SECTION 4(e)(2) AS MEANING "ANY CONTRACT, GRANT OR COOPERATIVE AGREEMENT ENTERED INTO BETWEEN ANY FEDERAL AGENCY AND ANY SMALL BUSINESS FOR THE PERFORMANCE OF EXPERIMENTAL, DEVELOPMENTAL OR RESEARCH WORK FUNDED IN WHOLE OR IN PART BY THE FEDERAL GOVERNMENT." OUR INTERPRETATION OF ITS STIMULATION PURPOSES

SUGGESTS THAT, PURSUANT TO P.L. 95-224, THE FEDERAL GRANT AND COOPERATIVE AGREEMENT ACT OF 1977, A GRANT INSTRUMENT IS TO BE USED FOR THIS PURPOSE.

SHOULD THE CONGRESS ENACT AN SBIR PROGRAM OF THE APPARENT CHARACTER EMBODIED IN H.R. 4326, AND AMPLIFIED IN HOUSE REPORT 97-349 ACCOMPANYING THE BILL, NASA WOULD MAKE EVERY EFFORT TO EXECUTE WHAT APPEARS TO BE A NEW ASSISTANCE MISSION GROWING TO SOME $180 MILLION IN THE FOURTH YEAR. SINCE THE LEGISLATIVE HISTORY OF THIS BILL ENVISIONS A THREE HUNDRED FOLD EXPANSION TO ALL MAJOR FEDERAL R&D AGENCIES OF THE CURRENT NATIONAL SCIENCE FOUNDATION GRANT PROGRAM, NASA WOULD HAVE TO ADDRESS SEVERAL QUESTIONS, THE ANSWERS TO WHICH NEED FURTHER STUDY. PUBLIC LAW 95-224, THE FEDERAL GRANT AND COOPERATIVE ACT OF 1977, DEFINES THE FUNDING INSTRUMENTS (I.E., GRANTS, COOPERATIVE AGREEMENTS, CONTRACTS) TO BE EMPLOYED UNDER THE OBJECTIVES OF THE VARIOUS TYPES OF FEDERAL FUNDING ACTIONS. IN THE CASE OF GRANTS, USE OF THIS TYPE OF AGREEMENT IS RESTRICTED TO THE ACCOMPLISHMENT OF A PUBLIC PURPOSE OF SUPPORT OR STIMULATION AUTHORIZED BY FEDERAL STATUTE WITH MINIMAL GOVERNMENTAL INVOLVEMENT ENVISIONED AND NO DIRECT BENEFIT TO THE GOVERNMENT EXPECTED. NASA, ON A VERY LIMITED BASIS, MAKES USE OF THE GRANT INSTRUMENT ONLY WITH UNIVERSITIES AND NONPROFIT RESEARCH ORGANIZATIONS TO INCREASE BASIC KNOWLEDGE AND UNDERSTANDING IN AERONAUTICS OR SPACE.

BY CONTRAST, THE NATIONAL SCIENCE FOUNDATION (NSF) PROMOTES THE PROGRESS OF SCIENCE AND ENGINEERING THROUGH THE SUPPORT OF RESEARCH AND EDUCATION PROGRAMS. ITS MAJOR EMPHASIS IS ON HIGH QUALITY, SCIENCE-DRIVEN RESEARCH, THE SEARCH FOR IMPROVED UNDERSTANDING OF THE FUNDAMENTAL LAWS OF NATURE, UPON WHICH OUR FUTURE WELL BEING AS A NATION IS DEPENDENT. THE NATIONAL SCIENCE FOUNDATION ALSO SUPPORTS APPLIED RESEARCH IN SEVERAL AREAS. ITS EDUCATIONAL PROGRAMS ARE AIMED AT ENSURING INCREASING UNDERSTANDING OF SCIENCE AT ALL EDUCATIONAL LEVELS AND AN ADEQUATE SUPPLY OF SCIENTISTS AND ENGINEERS TO MEET OUR COUNTRY'S NEEDS. THUS, THE ACTIVITIES OF THE NSF UNDER ITS CURRENT SBIR PROGRAM CLEARLY FALL WITHIN THE SCOPE OF ITS MISSION AND HAVE BEEN SPECIFICALLY AUTHORIZED BY THE CONGRESS.

THE LEGISLATIVE HISTORY OF THE BILL MAKES CLEAR THAT THE SBIR PROGRAM EMBODIED IN H.R. 4326 IS BASED UPON THE CURRENT NSF PROGRAM. SINCE THE NSF HAS LIKEWISE DETERMINED THE GRANT PROCESS TO BE THE APPROPRIATE INSTRUMENT UNDER P.L. 95-224 FOR ITS SBIR PROGRAM, WE CONCLUDE THAT THE PROGRAM ENVISIONED BY H.R. 4326 IS FUNDAMENTALLY AN ASSISTANCE PROGRAM TO SUPPORT RESEARCH CONSISTENT WITH NSF PROGRAMS.

NASA, IN CONTRAST TO NSF, HAS HAD A SPECIFIED MISSION AS SET FORTH IN P.L. 85-568 WHICH IS TO PLAN, DIRECT AND CONDUCT AERONAUTICAL AND SPACE ACTIVITIES. THESE ACTIVITIES ARE PRIMARILY FOR THE DIRECT BENEFIT OF THE GOVERNMENT. EVEN THOUGH

THE BULK OF NASA'S APPROPRIATIONS ARE COMPOSED OF R&D FUNDS, THOSE FUNDS ARE FOR THE PURPOSE OF ACCOMPLISHING NASA'S MISSION AS PREVIOUSLY IDENTIFIED. THUS, AN SBIR PROGRAM, AS ENVISIONED BY H.R. 4326, IS NOT SO COMPATIBLE WITH NASA'S PRIMARY MISSION AS IT IS WITH NSF'S. H.R. 4326 DOES NOT AUTHORIZE OR REQUIRE THAT ANY NEW FEDERAL MONEY BE AUTHORIZED FOR THIS PROGRAM BUT THAT FUNDS BE REALLOCATED WITHIN EXISTING BUDGETED FUNDS. IT APPEARS THAT EFFORTS OF THE CHARACTER PROPOSED IN THE FIRST PHASE OF THE SBIR PROGRAM UNDER H.R. 4326 WOULD MOST APPROPRIATELY FALL WITHIN THE AMBIT OF AUTHORIZATIONS BY THIS COMMITTEE FOR AERONAUTICAL AND SPACE RESEARCH AND TECHNOLOGY, THE PHYSICS AND ASTRONOMY AREAS OF SPACE SCIENCE, AND SPACE APPLICATIONS, UNDER WHICH MOST OF NASA'S SUPPORTING RESEARCH AND TECHNOLOGY EFFORTS ARE CONDUCTED. HERE, THE DIRECTION OF THIS COMMITTEE IN THE APPLICATION OF AUTHORIZED FUNDS, THE LIMITATIONS OF THE SCHMITT AMENDMENT, AND THE PROVISIONS OF H.R. 4326 MAY COME INTO CONFLICT. WE WOULD HAVE TO LOOK TO THIS COMMITTEE FOR GUIDANCE IN THE MATTER.

FOR THE ABOVE REASONS WE INTERPRET H.R. 4326 TO REQUIRE THAT NASA CREATE A NEW ASSISTANCE PROGRAM FOR SMALL BUSINESS FOR-PROFIT ENTITIES OF SOME $180 MILLION FOUR YEARS HENCE TO FURTHER OBJECTIVES OF SUPPORT OR STIMULATION AUTHORIZED BY FEDERAL STATUTE RATHER THAN DIRECT BENEFIT TO PRESENT NASA ENDEAVORS. ON THIS BASIS, IT IS PRESENTLY UNCLEAR TO US HOW AN SBIR PROGRAM AS

ENVISIONED BY H.R. 4326 WOULD ASSIST NASA IN CARRYING OUT OUR PRESENT PRIMARY MISSION.

YOU ALSO REQUESTED OUR VIEWS REGARDING THE POTENTIAL OF THIS LEGISLATION FOR INCREASING SMALL BUSINESS PARTICIPATION IN NASA'S RESEARCH AND DEVELOPMENT ACTIVITIES. WE PREVIOUSLY NOTED THAT SMALL BUSINESS CURRENTLY PARTICIPATES IN OUR RESEARCH AND DEVELOPMENT ACTIVITIES TO THE EXTENT OF A QUARTER OF A BILLION DOLLARS ANNUALLY THROUGH DIRECT CONTRACTS WITH NASA. ADDITIONALLY, NASA PRIME CONTRACTORS SUBCONTRACT SOME $132 MILLION IN RESEARCH AND DEVELOPMENT ANNUALLY WITH THE SMALL BUSINESS COMMUNITY. THIS PROCUREMENT IS IN DIRECT SUPPORT OF AUTHORIZED PROGRAMS AND PROVIDES A DIRECT BENEFIT TO THE GOVERNMENT. ON THE OTHER HAND, THE SBIR PROGRAM CONTEMPLATED BY H.R. 4326 APPEARS TO BE A SUBSTANTIALLY DIFFERENT CHARACTER. HOUSE REPORT 97-349, PART 1, DESCRIBES THE SBIR PROGRAM IN THE FOLLOWING TERMS:

"I. CHARACTER OF THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM

THE KEY ELEMENT IN THE EFFORT TO STIMULATE THE INNOVATIVE POTENTIAL OF SMALL SCIENCE AND HIGH-TECHNOLOGY COMPANIES IS THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM THAT FEDERAL AGENCIES WITH LARGE R&D BUDGETS WOULD BE REQUIRED TO ESTABLISH.

THE AGENCY SBIR PROGRAMS ARE TO BE MODELED ON THE HIGHLY SUCCESSFUL SMALL BUSINESS INNOVATION RESEARCH PROGRAM AT THE NATIONAL SCIENCE FOUNDATION, DESCRIBED PREVIOUSLY IN THE REPORT. THE GENERAL APPROACH OF THE NSF PROGRAM HAS ALREADY BEEN ADOPTED BY THE DEPARTMENT OF DEFENSE IN ITS SMALL BUSINESS ADVANCED TECHNOLOGY PROGRAM. THE PROGRAM ALSO HAS BEEN ENDORSED BY PRESIDENTS CARTER AND REAGAN.

THE APPLICATION OF THE SBIR PROGRAMS TO FEDERAL AGENCIES IS STRAIGHT FORWARD. ANY AGENCY WHOSE TOTAL R&D BUDGET EXCEEDS $100 MILLION ANNUALLY WOULD BE REQUIRED TO ESTABLISH A PROGRAM TO ASSIST SMALL BUSINESS IN OBTAINING A MORE EQUITABLE SHARE OF FEDERAL R&D EXPENDITURES. THE BILL WOULD USE THE SAME DEFINITION OF 'RESEARCH', AND 'RESEARCH AND DEVELOPMENT' THAT IS USED IN THE OFFICE OF MANAGEMENT AND BUDGET CIRCULAR A-11, SECTION 44. THIS IS THE DEFINITION AGENCIES CURRENTLY USE IN REPORTING TO OMB.

THE BILL WOULD DEFINE FEDERAL AGENCY IN A WAY THAT DIFFERS FROM THAT USED FOR OTHER SMALL BUSINESS ADMINISTRATION PROGRAMS. THE COMMITTEE FEELS THAT A SEPARATE DEFINITION IS NECESSARY TO ENSURE THAT THE BROADEST APPLICATION OF 'AGENCY' WITH TITLE 5 OF THE UNITED STATES CODE WOULD BE USED. IN ADDITION, THE BILL WOULD PROVIDE THAT WORK UNDER SBIR PROGRAMS MAY BE CONDUCTED THROUGH CONTRACTS, GRANTS OR COOPERATIVE AGREEMENTS.

A. PROGRAM PHASES

THE BILL DEFINES THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM AND DESCRIBES THE PROGRAM'S THREE PHASES. FOR PURPOSES OF THIS BILL, LANGUAGE DESCRIBING THE FIRST PHASE OF THE SBIR PROGRAM HAS BEEN CHANGED FROM REQUIRING PHASE I PROPOSALS TO BE EVALUATED ACCORDING TO 'TECHNICAL AND ECONOMIC FEASIBILITY' TO REQUIRING THAT THEY BE JUDGED PRINCIPALLY UPON THEIR 'SCIENTIFIC AND TECHNICAL MERIT.' PHASE I IS OFTEN TOO EARLY TO ACCURATELY EVALUATE ECONOMIC FEASIBILITY IN R&D EFFORTS. PHASE II, HOWEVER, CAN INTRODUCE BOTH TECHNICAL AND ECONOMIC FEASIBILITY FOR GOVERNMENT NEEDS. FURTHER, THE COMMERCIAL POTENTIAL OF PROPOSALS IS ASSESSED EFFECTIVELY AT THE SECOND PHASE THROUGH THE FOLLOW-ON FUNDING COMMITMENT.

THE MOST SCIENTIFICALLY AND TECHNICALLY FEASIBLE PROPOSALS WOULD BE AWARDED SMALL GRANTS ($30,000-$50,000) IN PHASE I TO FUND A FEASIBILITY RESEARCH OR R&D EFFORT. THOSE PROJECTS JUDGED MOST PROMISING IN THE FIRST PHASE COULD THEN QUALIFY FOR A SECOND PHASE OF FUNDING (WHICH CURRENTLY RANGES FROM $100,000-$500,000). NOT ONLY DOES THE FEDERAL GOVERNMENT OBTAIN THE FREE USE OF ANY INVENTION DEVELOPED, BUT IT ALSO OBTAINS TAX REVENUE RESULTING FROM COMMERCIALIZATION OF ANY SUCH PATENTED INVENTION BY THE R&D RECIPIENT.

COMMERCIALIZATION OF THE RESULTS OF THE R&D WOULD BE LEFT IN MOST CASES TO THE PRIVATE SECTOR UNDER PHASE III. THE DEFINITION OF THE THIRD PHASE WAS CHANGED TO CLARIFY THE COMMITTEE'S INTENT

THAT THE FUNDING OF THIS PHASE NOT BE REQUIRED, BUT THAT PROPOSALS WITH COMMITMENTS FOR FOLLOW-ON PRIVATE FUNDING TO PURSUE COMMERCIAL APPLICATIONS RECEIVE EXTRA CONSIDERATION IN THE EVALUATION PROCESS. THE COMMITTEE ALSO WANTED TO CLARIFY ITS INTENT THAT FOLLOW-ON PRODUCTION CONTRACTS MAY BE COMPETITIVELY PROCURED, AND ADDED LANGUAGE TO THIS EFFECT."

THE WEIGHT OF OUR EXPERIENCE WITH SMALL BUSINESS LEADS US TO HAVE THE FOLLOWING RESERVATIONS AS TO THE POTENTIAL INHERENT IN H.R. 4326 FOR INCREASING SMALL BUSINESS PARTICIPATION IN NASA'S RESEARCH AND DEVELOPMENT ACTIVITIES AND TO DERIVE RESEARCH AND DEVELOPMENT BENEFITS TO AGENCY APPROVEL PROGRAMS COMMENSURATE WITH THE APPROPRIATION EXPENDITURES THE BILL WOULD DIRECT.

THESE RESERVATIONS FALL IN SEVERAL CATEGORIES. FIRST, THE CONGRESSIONAL BUDGET OFFICE ESTIMATES OF APPROPRIATION SET-ASIDES WHICH WOULD BE REQUIRED UNDER THE TWO BILLS, WHEN COMPARED TO THE PRESENT $5 MILLION NSF SBIR GRANT PROGRAM, GRAPHICALLY PORTRAY THE FIVE YEAR ORDER OF MAGNITUDE EXPANSION ENVISIONED FOR THIS CONCEPT.

	CBO ESTIMATES	
FISCAL YEAR	UNDER S. 881	UNDER H.R. 4326
1982	$ 75 MILLION	$ 200 MILLION
1983	205	440

1984	355	955
1985	385	1,545
1986	415	1,665

THE SBIR IS TO BE A NEW PROGRAM OVERLAID ON TOP OF EXISTING AGENCY R&D SMALL BUSINESS PROGRAMS, CONDUCTED IN A DIFFERENT MANNER YET PRESUMABLY TAPPING THE SAME SMALL BUSINESS RESEARCH COMMUNITY. CONSIDERING THE SIZE OF THE FUNDING ACTIONS IN EACH PROGRAM PHASE AS CONTEMPLATED BY THE HOUSE SMALL BUSINESS COMMITTEE, THE PROPOSAL ACTIVITY AND RESULTING FUNDING ACTIONS NECESSARY TO EXECUTE SUCH A SET-ASIDE MANDATE CANNOT BUT IMPACT EXISTING AGENCY SMALL BUSINESS PROGRAMS IN WAYS IT IS DIFFICULT TO SEE. WE BELIEVE THE MORE MODEST YET SUBSTANTIAL RATES OF SET-ASIDE INCREASE EMBODIED IN S. 881 WOULD PROVIDE FOR A MORE ORDERLY DEVELOPMENT AND APPLICATION OF SUCH AN SBIR CONCEPT ACROSS ALL AGENCIES AND ALLOW A FAIR TEST OF ITS WORTH. ALTHOUGH A RANGE OF OPINIONS EXISTS ON THE MATTER, SUCH A TEST WOULD PROVIDE A FACTUAL BASIS FOR DETERMINING THE EXTENT TO WHICH A SMALL BUSINESS INNOVATION BASE EXISTS TO ABSORB IN A MEANINGFUL WAY THE SUBSTANTIAL AGENCY RESOURCES WHICH WOULD BE DIRECTED SOLELY TO RELIANCE UPON SMALL BUSINESS CAPABILITIES TO FULFILL FEDERAL NEEDS IN A MULTIPLICITY OF DISCIPLINES.

ANOTHER RESERVATION DERIVES FROM THE TECHNICAL CAPACITY OF THE COMMUNITY OF FIRMS THAT WOULD BE INVOLVED IN THE SBIR

PROGRAM. NASA IS PROUD THAT THE SPACE EFFORT HAS BEEN A COOPERATIVE EFFORT WITH INDUSTRY, ESPECIALLY SMALL BUSINESS AND ACADEMIA. THIS COMMITTEE IS WELL ACQUAINTED WITH NASA'S ACCOMPLISHMENTS IN OUR EFFORTS TO SUPPORT THE SMALL BUSINESS COMMUNITY. WE WERE THE FIRST AGENCY TO IMPLEMENT THE PROVISIONS OF P.L. 96-517 PERMITTING SMALL BUSINESS TO RETAIN PATENT RIGHTS ON DISCOVERIES MADE IN THE PERFORMANCE OF FEDERAL CONTRACTS. LONG BEFORE THAT, HOWEVER, THE NASA PROCUREMENT PLANNING AND REVIEW PROCESS LED TO SUBSTANTIAL PARTICIPATION THROUGH SMALL BUSINESS SET-ASIDES, SECTION 8(a) AWARDS, AND SUBCONTRACTING. NOR HAS OUR EFFORT STOPPED WITH THOSE PROGRAMS. NASA ANNUALLY ACQUAINTS SMALL BUSINESS WITH ITS RESEARCH AND TECHNOLOGICAL ACTIVITIES THROUGH A RESEARCH AND TECHNOLOGY OBJECTIVES AND PLANS SUMMARY. IT IS LONG-STANDING NASA POLICY TO ENCOURAGE THE PARTICIPATION OF SMALL RESEARCH FIRMS IN ITS WORK THROUGH THE MEDIUM OF UNSOLICITED PROPOSALS. SMALL BUSINESS ALSO REAPS THE BENEFITS OF NASA'S OPERATION THROUGH THE SEVERAL PARTS OF THE TECHNOLOGY UTILIZATION PROGRAM.

IN SPITE OF OUR PAST ACCOMPLISHMENTS, WE HAVE NO CONCRETE EVIDENCE, AT THIS TIME, OF THE ABILITY OF THAT SEGMENT OF SMALL BUSINESS THAT CONDUCTS RESEARCH AND DEVELOPMENT TO INCREASE ITS CAPACITY OR EXPAND ITS BASE SUFFICIENTLY TO ACCOMPLISH AN SBIR PROGRAM OF THE MAGNITUDE CONTEMPLATED UNDER H.R. 4326. IF R&D AGENCIES BECOME BOUND BY STATUTE TO SET ASIDE A FIXED PERCENTAGE

OF THEIR BUDGETS FOR AN SBIR PROGRAM AND IF THE SMALL BUSINESS COMMUNITY CANNOT PRODUCE SUFFICIENT LEGITIMATE AND FRUITFUL IDEAS TO MERIT AWARDS, THE AGENCIES MAY EITHER HAVE TO SPEND MONEY ON MARGINAL PROJECTS TO MEET A LEGISLATIVE SET ASIDE OR WITNESS THE LOSS OF FUNDS SINCE THE LEGISLATION APPEARS TO LEAVE NO DISCRETION IN THIS MATTER. IN THOSE INSTANCES WHERE AN AGENCY WERE UNABLE TO MEET ITS SBIR SET-ASIDES, CRITICISM COULD BE DIRECTED NOT AT THE QUALITY OF AN AGENCY'S GRANT OR CONTRACT AWARDS BUT RATHER TOWARD THE FAILURE OF THE AGENCY TO EXPEND ALL THE MONEY REQUIRED BY A LEGISLATIVE MANDATE. FURTHERMORE, WHENEVER A "SPEND OR LOSE" CONCEPT IS EMBODIED IN LEGISLATION INVOLVING APPROPRIATIONS, THE POTENTIAL FOR IMPROVIDENT OR MARGINAL OBLIGATIONS CAN BE INCREASED. S. 881, HOWEVER, AT ONE-THIRD THE SCALE OF H.R. 4326, CAN BE ACCOMMODATED AND IS NOT EXPECTED TO PRESENT THE SAME PROBLEMS.

FINALLY, YOU INDICATED AN INTEREST IN ANY OTHER COMMENTS THAT WE MIGHT OFFER ON THIS LEGISLATION. AS WE INDICATED PREVIOUSLY IN THIS STATEMENT, AS WELL AS IN ALL PRIOR STATEMENTS PERTAINING TO THESE BILLS, NASA FIRMLY SUPPORTS THE OBJECTIVES OF THE SEVERAL BILLS INTRODUCED ON THIS SUBJECT. HOWEVER, WE BELIEVE THAT THERE MAY BE MAJOR DIFFICULTIES FOR THE AGENCIES WITH SOME OF THE APPROACHES TAKEN IN H.R. 4326 TO ACCOMPLISH THE PRIMARY OBJECTIVES OF HELPING SMALL BUSINESSES OBTAIN A GREATER PORTION OF THE GOVERNMENT'S R&D REQUIREMENTS. WE THEREFORE ACCEPT YOUR

INVITATION AND OFFER THE FOLLOWING FOR YOUR CONSIDERATION WHEN MAKING PERFECTING AMENDMENTS TO THIS INITIATIVE.

OUR FIRST RECOMMENDATION IS THAT YOU EXTEND TO H.R. 4326 THAT FEATURE OF S. 881 WHICH ELIMINATES THE AGENCIES' IN-HOUSE R&D EFFORT FROM THE COMPUTATIONAL BASE, BECAUSE THAT EFFORT IS USUALLY MANDATED BY CONGRESS TO BE ACCOMPLISHED BY THE AGENCIES AND IS THE TYPE OF EFFORT NOT COMPATIBLE WITH AN SBIR PROGRAM. THIS ACTION WOULD PROVIDE A REALISTIC BASE THAT AGENCIES HAVE AT THEIR DISPOSAL TO AWARD SBIR CONTRACTS OR GRANTS.

H.R. 4326 PROVIDES THAT BOTH THE SMALL BUSINESS ADMINISTATION AND THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY INDEPENDENTLY SURVEY AND MONITOR THE SBIR ACTIVITIES OF THE PARTICIPATING FEDERAL AGENCIES. WE SEE NO NEED FOR SUCH DUPLICATION. BECAUSE OF ITS SPECIFIC RESPONSIBILITIES FOR THE BALANCE OF FEDERAL SCIENCE PROGRAMS, ITS SCIENTIFIC EXPERTISE, AND ITS ROLE AS ADVISOR TO THE PRESIDENT ON SCIENCE POLICY, WE BELIEVE THE OSTP BETTER QUALIFIED TO PERFORM THIS TASK. THE SBA IS APPROPRIATELY AN ADVOCATE FOR SMALL BUSINESS; ITS MAIN FOCUS IS TO INCREASE THE NUMBERS AND DOLLAR LEVELS OF AWARDS TO SMALL BUSINESS. IT HAS NEITHER THE MANDATE NOR THE EXPERTISE TO PLAY A ROLE IN NATIONAL SCIENCE PROGRAMS OR POLICY.

SECTION 4(j) OF H.R. 4326 PROVIDES THAT SBA, AFTER CONSULTATION WITH OTHER AGENCIES, SHALL ISSUE POLICY DIRECTIVES

RELATED TO THE SBIR PROGRAMS OF THE MISSION AGENCIES. SECTION 3(f) OF S. 881 ASSIGNS A SIMILAR RESPONSIBILITY TO THE OFFICE OF FEDERAL PROCUREMENT POLICY. WE THINK THE OFPP IS THE MORE APPROPRIATE FOR TWO REASONS. FIRST, OFPP IS CHARGED BY P.L. 93-400, AS AMENDED, WITH PROVIDING THE OVERALL LEADERSHIP AND COORDINATION ROLES IN DEVELOPING PROCUREMENT POLICY FOR THE EXECUTIVE BRANCH. SECOND, BECAUSE OF ITS BROADER RESPONSIBILITIES AND ITS RELATIONSHIP TO OTHER UNITS OF THE EXECUTIVE OFFICE OF THE PRESIDENT, THE OFPP SEEMS MORE LIKELY TO SEE THE SBIR PROGRAMS IN THE BROADER CONTEXT OF OVERALL FEDERAL RESEARCH PROGRAMS.

TO DEVELOP AND OPERATE A GREATLY EXPANDED SBIR PROGRAM WOULD REQUIRE MORE PERSONNEL AND FUNDS THAN THOSE ASSOCIATED WITH THE NSF PROGRAM. IN OUR JUDGMENT, THE RESOURCES REQUIRED TO OPERATE NASA'S PROGRAM CANNOT BE ESTIMATED BY EXTRAPOLATING FROM THE NSF CENTRALLY ADMINISTERED EXPERIENCE SINCE ALL NASA CENTERS WOULD BE INVOLVED. OUR LETTER OF JANUARY 22, 1982, DETAILED OUR BEST CURRENT ESTIMATES OF ADMINISTRATIVE COSTS ON THIS BASIS. WE BELIEVE THE COMMITTEE SHOULD WEIGH THESE FACTORS CAREFULLY IN CONSIDERING THE SBIR AS NOW PROPOSED IN H.R. 4326.

NOR DO OUR RESERVATIONS END WITH CONSIDERATION OF THE METHOD OF AWARDING SBIR CONTRACTS. THE SIZE AND NOVELTY OF THE SBIR PROGRAM PROPOSED IN H.R. 4326 DESERVE, WE BELIEVE, SPECIAL CONSIDERATION AS TO THE PERIOD OF ITS EFFECTIVENESS. BOTH NSF

AND DOD PROGRAMS ARE TOO SMALL AND RECENT TO HAVE PRODUCED A CONCRETE RECORD ON WHICH TO BASE AN ACCURATE PREDICTION. FOR THE PRESENT, WE HAVE ONLY A VERY SMALL DATA BASE ON WHICH TO MAKE JUDGMENTS. FOR THIS AND OTHER REASONS, WE BELIEVE A SPECIFIED TRIAL PERIOD IS APPROPRIATE TO ACCUMULATE A VALID DATA BASE.

DURING THE PERIOD WHEN THE SBIR PROGRAM PROPOSED BY H.R. 4326 MATURES INTO A SET-ASIDE PROGRAM OF OVER $1 BILLION PER YEAR IN INNOVATIVE RESEARCH, IT MAY BECOME APPARENT THAT THE TECHNICAL CAPACITY PRESUMED TO EXIST WITHIN THE SMALL BUSINESS COMMUNITY IS NOT PRESENT OR THAT PREDICTED BENEFITS HAVE NOT MATERIALIZED. WE SUGGEST THAT H.R. 4326 BE AMENDED NOW TO SET A FIVE YEAR REVIEW OF THE OPERATION OF THIS NEW CONCEPT. A REVIEW IN FIVE YEARS WOULD, IN OUR OPINION, ALLOW THE PROGRAM SUFFICIENT TIME TO OPERATE THROUGH SEVERAL CYCLES OF ITS THREE-PHASED FORMAT. WHEN THIS REVIEW IS COMPLETED, CONGRESS WOULD THEN HAVE ADEQUATE DATA FOR JUDGING THE ADVANTAGES OF A GOVERNMENT-WIDE SBIR PROGRAM. IF THE RESULTS FULFILL CONGRESSIONAL EXPECTATIONS THEN, THE PROGRAM COULD BE APPROPRIATELY CONTINUED. ON THE OTHER HAND, SHOULD THE ANTICIPATED BENEFITS NOT MATERIALIZE, THE CONGRESS COULD THEN CONSIDER THE ALTERNATIVE OF AMENDING THE LEGISLATION TO ACHIEVE THE DESIRED OBJECTIVES.

THERE CAN BE NO DOUBT THAT ALL CONCERNED PARTIES WOULD BENEFIT FROM A FIVE-YEAR REVIEW PERIOD. THE AGENCIES WOULD HAVE A CLEAR VIEW OF THE EFFECT NOT ONLY ON THEIR OTHER SMALL BUSINESS INITIATIVES BUT ALSO ON THEIR RESEARCH AND DEVELOPMENT PROGRAMS. THE GAO COULD LIKEWISE REACH AN INDEPENDENT ASSESSMENT OF THE SBIR PROGRAM'S VALUE TO THE NATION. MORE IMPORTANTLY, THE PRIVATE SECTOR WOULD HAVE HAD TIME TO DEVELOP THE PHASE III IDEAS INTO MARKETING PROGRAMS THAT WOULD BE COMMERCIALLY VIABLE AND PRODUCTIVE OF THE TAX REVENUES FORESEEN BY H.R. 4326.

MR. CHAIRMAN, THIS CONCLUDES MY FORMAL STATEMENT. I AM PREPARED TO ANSWER ANY QUESTIONS YOU MAY HAVE REGARDING THE SUBJECT.

Mr. RAUCH. Mr. Chairman and committee members, I am Hilary Rauch, the Director of Procurement and Assistance Management in the Department of Energy, and I am pleased to be here as a witness on the subject of H.R. 4326.

The Department of Energy does indeed support the common objectives of H.R. 4326 and S. 881, and we have long recognized the role of small business in innovative research activities and have undertaken a number of initiatives directed toward the very same objectives.

In the interests of brevity I will try to summarize my testimony and only emphasize those aspects of Senate bill 881 which the Department of Energy feels are preferable, yielding the balance of the time to questioning.

One very important point to this Department is the exclusion of so-called intramural research as envisioned by S. 881. In addition the lower 1 percent set-aside level, as all witnesses have seemed to indicate, seems much more appropriate for testing a program expansion of the nature envisioned here.

Similarly, the so-called Schmitt amendment or some form similar to it, we believe, is absolutely essential to the successful execution of this kind of program in a research and development agency such as the Department of Energy.

I, too, would support oversight by the more appropriate bodies heretofore mentioned. Both OFPP and the Office of Science and Technology are more appropriate to the kind of program envisioned by H.R. 4326.

With respect to peer review, in the Department we engage in many forms of peer review, depending on the nature of the program requirement. Therefore, we believe the flexibility fundamentally inherent in the Senate version is preferable on this issue.

Finally, I would like to appeal to the committee that some attention be given to consistent terminology for the benefit of the government employees who must implement it. I will not take your time here at the table to touch on the various terms; but I am sure all of us working together could improve our ability to carry out your objectives if we have fairly consistent terminology in the final analysis.

One last point, if I may. The Department of Energy has experimented in the past with a number of fairly innovative, not necessarily unique, program solicitations of types that encourage the submission of proposals of the very sort envisioned in these bills. We would hope that in the resulting legislation some forms of solicitations, such as our program research and development announcement, which was authorized under a Federal Act, would still be permitted for the various programmatic requirements of the Department.

I therefore appeal for some flexibility in how the solicitation format is envisioned, either in the bill or in the legislative history, so that departments such as ours could continue to use the successful techniques that we already have as well as add to them for purposes of this program.

In closing, again I support Senate 881 and would support amendments to H.R. 4326 along the lines I have mentioned.

[The prepared statement of Mr. Rauch follows:]

STATEMENT OF HILARY RAUCH
DIRECTOR, PROCUREMENT AND ASSISTANCE MANAGEMENT
DEPARTMENT OF ENERGY
BEFORE
THE COMMITTEE ON SCIENCE AND TECHNOLOGY
OF THE
HOUSE OF REPRESENTATIVES
JANUARY 26, 1982

Mr. Chairman, I am pleased to appear as a witness today on the subject of H.R. 4326, the "Small Business Innovation Development Act of 1981." With me today are Mr. John Shepard, Director of the Office of Small and Disadvantaged Business Utilization and Dr. Richard Kropschot, Associate Director for Basic Energy Sciences of the Office of Energy Research. It is my understanding that the Committee desires some comparison of H.R. 4326 with S. 881, the "Small Business Innovation Research Act of 1981" passed by the Senate on December 8, 1981.

The Department of Energy (DOE) supports the common objectives of H.R. 4326 and S. 881. Both the President and the Congress have forcefully stated the need to support and enhance the role of small businesses in federally funded research and development. The Department of Energy has recognized the role of small business in this regard and has undertaken a number of initiatives directed toward the same objectives. A brief description of these initiatives is submitted with this testimony.

Both of these bills are intended, as we understand them, to further some of the same goals which we are pursuing in our small business program. However, Mr. Chairman, DOE endorses the Senate bill, S. 881, for reasons that I will set forth in a moment. The Administration believes the Small Business Innovation Research (SBIR) Program envisioned in S. 881 would be more suitable for the Executive Branch.

I will address two major topics. First, I will point out some of those areas where S. 881 is considered preferable to H.R. 4326. Second, there are certain matters which we believe require clarification in order to facilitate effective implementation of the legislation.

The following points explain our position in preferring S. 881 to H.R. 4326:

1. S. 881 excludes in-house research when establishing the total Federal obligations against which the SBIR goals are to be established. H.R. 4326 makes no such provision. Funds which are not available for contractor activity should not be considered in developing goals under this legislation.

2. The DOE is concerned about the eventual level of small business participation envisioned by H.R. 4326. The Congressional Budget Office (CBO) has provided federalwide estimates which clearly summarize the situation:

CBO Estimates

Fiscal Year	Under S. 881	Under H.R. 4326
1982	$75 million	$200 million
1983	$205 million	$440 million
1984	$355 million	$955 million
1985	$385 million	$1,545 million
1986	$415 million	$1,665 million

These amounts are expected to be in addition to current small business research and development (R&D) awards by the Federal Government. Based on the CBO's projections and assuming that the differences between the two bills apply equally to all Federal agencies, the DOE must consider that H.R. 4326 actually represents a program four times the size of S. 881 by Fiscal Year 1985. We are concerned that a program of this magnitude could severely tax the ability of the small business R&D community. Accordingly, we feel that the one percent specified by S. 881 would provide a sufficient program size for a fair test of the concept. Such a program size will allow all parties to more carefully assess the quality of the scientific efforts proposed. Until the potential of the small business research community has been tested in terms of a steady flow of high quality proposals at the one percent level, it is risky to mandate an increase first to two percent and then to three percent. Again, the DOE endorses S. 881 on this point.

3. Mr. Chairman, you specifically requested that we address the Schmitt Amendment to S. 881. No similar provision is provided in H.R. 4326. The purpose of the amendment as we understand it is to assure that the impact of the SBIR Program falls equitably upon basic and applied research and to limit the impact upon Government-Owned, Contractor-Operated (GOCO) facilities' R&D. The Department endorses the Schmitt amendment. Without this amendment, the basic research and development programs of this Department could be impacted severely in order to provide for SBIR awards in applied research.

4. There are certain policy and procedural matters which S. 881 contains and which we endorse. First, H.R. 4326 provides that agencies report to both the Small Business Administration (SBA) and the Office of Science and Technology Policy (OSTP). This oversight duality lends itself to confusion and perhaps even conflict or delay. The SBA has little expertise in the technological

area and in fact should, in any event, function to assist OSTP and the agencies rather than monitor the program. The OSTP is well qualified to fill this oversight role because of its responsibility for the Federal science programs.

Second, Section 4(j) of H.R. 4326 provides that the SBA issue policy directives after consultation with other agencies. In Section 3(f) of S. 881, this role is assigned to the Office of Federal Procurement Policy (OFPP). OFPP was, also, the agency responsible for a similar role under Public Law 95-507 and Public Law 95-224. In addition, OFPP is charged with the effort to simplify governmental procedures including those akin to requirements in the SBIR Program. Therefore, the designation of OFPP by S. 881 is considered more appropriate. Third, the requirements of H.R. 4326 in Section 4(j)(2)(B) for outside peer review "for at least phase two proposals" (emphasis added) provides a distinct contrast to the S. 881 requirement [Section 3(e)(3)(A)] that peer review be used "as appropriate." We endorse the greater flexibility of S. 881 which allows the use of existing research review methods for both SBIR and other similar activities. Policy guidance on standards should minimize the need to depart from the methods and procedures evolved by the Department to suit its particular research and development mission. It is our view that H.R. 4326 is likely to require additional staff, increase costs, and cause additional delays in the procurement or assistance process. The same quality controls that apply to DOE's unique research activities should apply to its SBIR Program as well. DOE would thus use peer review as "appropriate" and at its discretion. This increases the likelihood that grants and contracts with small business for innovative research will be handled more efficiently.

The Department recognizes that no new research funds are to be given for the SBIR. However, it will be a new program and the manpower impact is not clear. For example, one estimate sets a first-year DOE dollar value of SBIR funding under H.R. 4326 at over $24 million. At a median of $40,000 per Phase I agreement, this represents 600 funded proposals. The experience of the National Science Foundation and the Department of Defense reveals that approximately 10 percent of the submitted proposals are funded. Even if the net of 600 proposals is reduced, the volume of submitted and evaluated proposals could create a manpower impact since we ordinarily do not receive such a high number of small dollar proposals in many of our research activities. These potential impacts will need to be addressed through the normal budgetary channels.

Lastly, given the experimental stage at which this program exists on a federalwide basis, the DOE strongly urges that an independent evaluation be given high priority. For this reason, we endorse a provision that requires a qualified governmental organization to evaluate the longer term significance of the research conducted under the program. We respectfully suggest that such an evaluation be carried out and appropriate timeframes should be endorsed by this Committee.

Mr. Chairman, the points I have just listed represent specific items which lead the DOE to feel that S. 881 is preferable to H.R. 4326. There are certain other points that the Department hopes can be clarified. These are identified below:

1. We are all acquainted with the distinctions between authorizations, appropriations, awards, obligations, and outlays or expenditures. It will be extremely beneficial if the legislation clearly establishes which of these

terms are applicable to the program. It would be best if consistent terminology were used throughout the legislation.

2. The DOE interprets both H.R. 4326 and S. 881 as allowing the use of grants, cooperative agreements, or contracts at its discretion within the definitions provided by Public Law 95-224. This discretion is important and DOE would hope that it could be reflected in the Committee's report.

3. The concept of an escalation of either the "ceiling" and "floor" is of concern to DOE. We read Section 9(h) of the Small Business Act, as set forth in Section 4 of H.R. 4326 as providing a constantly escalating "goal" but as not providing a constantly escalating "floor." The experience of DOE in implementing goals has shown that if a penalty is to be imposed upon an office because it made a special effort or substantially overachieved in any given year, then that office or agency tends to seek to achieve only the minimum required. For example, if, when requiring three percent, the achievement is actually 10 percent because of unusual circumstances, we must carefully examine whether to escalate the next year's goal to above 10 percent for that office. The net effect could be to dampen special efforts and to achieve only the minimum required each year.

Equally serious, if it is intended that the "floor" be escalated each year by the elimination of the previous fiscal years' SBIR achievements, then DOE must assume a rapidly escalating requirement for SBIR awards. This is particularly true when goals are successfully attained. In this case, the amount of the new goal would represent an addition to the previous goals and an escalation by that amount. The DOE recognizes that there is a need to exclude previous small business R&D funding at this point in time but is it intended that each year's achievements shall be so excluded? If so, this too may impact negatively on special efforts of offices or agencies to make the program a success.

Finally, Mr. Chairman, let me reiterate the Administration's support for the SBIR Program and for the intent and purposes of both H.R. 4326 and the Senate bill, S. 881. For the reasons given, we find that S. 881 is a preferable bill in certain respects and will better support the goal of utilizing small business more effectively in the R&D arena.

This concludes my testimony. Thank you for the opportunity to present the position of the Department of Energy on this SBIR legislation.

I, and my colleagues, stand ready to respond to questions.

Attachment

REVIEW OF THE DEPARTMENT OF ENERGY INITIATIVES REGARDING SMALL BUSINESS AND RESEARCH AND DEVELOPMENT

The Department of Energy (DOE) formally came into existence on October 1, 1977. The Energy Research and Development Administration (ERDA), a principal predecessor agency of the DOE, served on the seven member "Ad Hoc Interagency Panel on Small Firms and Federal Research and Development." This panel was instrumental in the analysis of the Federal research and development (R&D) problem as it related to small firms and to the recommended solutions set forth. The report of this panel, chaired by Dr. Jacob Rabinow, was submitted to the Office of Federal Procurement Policy, Office of Management and Budget, on February 24, 1977. By virtue of ERDA's participation, DOE was initimately acquainted with the so called "Rabinow Report" even though it was not formally released to Federal agencies until September 20, 1978, i.e., over 18 months later.

In studying the problem, the DOE viewed the issue of small business research and development participation as fundamentally allied with the promotion of small business contracts and the promotion of small business set-asides in particular. Further, it was, and still is, considered a problem requiring long-term effort in order to produce the type of growing small business participation desired. Therefore, a strong, long-term program was implemented even as the DOE was undergoing formation.

Some of the actions taken were as follows:

1. A special office was created on October 1, 1977, to coordinate the small business, the disadvantaged business, and the labor surplus area programs. This office, Procurement Business Affairs, was considered necessary to ensure effective liaison with the small business high technology sector as well as the maintenance of programmatic coordination with Small and Disadvantaged Specialists at each major field location. These specialists were also designated in October 1977.

The responsibilities of the Procurement Business Affairs Office included coordination of those additional initiatives I am about to address. This Office had been responsible for the preparation of reports to the Congress on small business and small business R&D since October 1977. On January 31, 1979, functions of the Procurement Business Affairs Office and other legislatively mandated activities were vested in the Office of Small and Disadvantaged Business. This continuity is considered important, and it is this office which is able to "screen" procurements for small business R&D and other types of requirements suitable for small and disadvantaged business as described in the material submitted to the Congress.

2. The Department determined that long-term growth in the usage of small business firms, especially research and development firms, required a data bank giving the capabilities of small technology based firms which could be easily accessed by any of its major field offices and its major research and development facilities (contractor-operated). The Department jointly developed and funded the Procurement Automated Source System (PASS), with the Small Business Administration. Since the Department was the co-founder of the system (now used throughout the Government), it was able to require priority loading of R&D "key words." This nationwide system now contains 53,389 small business

firms of which 11,596 are R&D firms. There are approximately 80 terminals in use across the Nation. Twenty-two of these terminals are used by the DOE, providing easy access to small firms in all forms of high technology.

3. In order to insure that every procurement would be considered for small business (including disadvantaged business) and that small business set-asides would be emphasized, the Department instituted a mandatory, independent screening process. Appropriate procurement actions were, and are, reviewed in advance of solicitation by a Small Business Specialist of the Department to determine whether all or a portion may be suitable for small businesses. Procurement processing is completed only after this review has taken place.

4. The special use of unsolicited proposals was also considered vital. The Department took two crucial steps. First, it instituted a centralized unsolicited proposal system, with its own computer based tracking system, thus providing for expeditious consideration of proposals.

Second, the Department established unsolicited proposal reserves in order to stimulate submission of innovative approaches from the small business, high-technology sector.

5. The Department instituted a comprehensive goaling program on October 1, 1977. This program involved the establishment of individual goals for every program office, every procurement activity, and every Government-Owned, Contractor Operated (GOCO) facility as well as other major contractors. These were negotiated and approved annually for each separate component, i.e., small business, disadvantaged business, labor surplus area set-asides, and women-owned businesses.

6. The Department considered that special efforts were necessary to notify the small business firms of the need for innovative approaches. Three special forms of notices and solicitations were developed. First, the Program Research and Development Announcement (PRDA) solicits proposals in areas where R&D is required within broadly defined areas of interest but where it is difficult to describe the precise nature of the work to be undertaken. In this case, even multiple awards may be made with dissimilar approaches or concepts. This supports new and creative solutions. Second, a Notice of Program Interest (NPI), which is not a solicitation, periodically is used to set forth areas of interest concerning research where DOE hopes to receive unsolicited proposals. Third, a Program Opportunity Notice (PON) has been used to solicit proposals for nonnuclear demonstration projects using existing commercial technology, e.g., technology already developed by a small firm. These three approaches have been considered a very important part of the DOE program to stimulate and support small business R&D.

7. The Department engaged in the equivalent of a Small Business Innovation Program, suitable for energy technology, almost two years prior to the President's October 31, 1979, request that the National Science Foundation explore the feasibility of such programs in other agencies. This effort included the Energy Inventions Program, the Appropriate Technology Small Grants Program, augmented by other initiatives.

6. The Department further determined that the promotion of small business usage through its offices and its laboratories, testing facilities, and plants (operated by contractors) would be enhanced by special recognition from the Secretary. As a result, in March of 1978, the Secretary established a special system of awards to offices and GOCO facilities: (1) for those who exceeded their goals, and (2) those who exceeded their goals by 20 percent with highly meritorious effort. These awards are now highly coveted throughout the Department and its plants and laboratories.

Other initiatives were taken, tested, reformulated, and became a part of a long-range program. By way of partially indicating the results of this effort, the non-GOCO R&D prime contract obligations for Fiscal Year 1980 totalled $942.9 million. Of this $88.9 million or 9.43 percent was awarded to small business. Our GOCO laboratories, testing facilities, and plants during this same period subcontracted $1.765 billion of which $219.3 million was for R&D. Of this, $57 million or 26 percent was awarded to small businesses. These results were achieved through program building tailored to the unique demands of the DOE.

Mr. KIRSCHENMANN. My name is Henry G. Kirschenmann, Jr., Deputy Assistant Secretary for Procurement, Assistance and Logistics, Department of Health and Human Services. I have with me my colleague Dr. William F. Raub, Associate Director for Research and Training at NIH. Since NIH is the primary organization within our Department that is involved in research, the great opportunities presented by this bill will fall mostly to them.

I have already submitted written testimony in which we summarize the actions my Department has taken, and specifically NIH, in dealing with small businesses, and have indicated that we also support the purposes and objectives of both H.R. 4326 and S. 881.

In my testimony on the Small Business Innovation Research Act before both the Senate and the House Small Business Committees, I expressed concern, however, that our experience in attempting to identify small businesses through our "resources sought" announcements and conferences indicated a relative paucity of small businesses which possess biomedical research capabilities, especially in the basic science area.

We, like the other agencies and the Office of Science and Technology, believe it is unlikely that there are hundreds of new firms in the area of biomedical research which could take advantage of the SBIR program. We base this belief on the fact that the existing private sector health research effort is concentrated for the most part in larger firms and that the nature of this research requires, as in the case of drug development, the investment of millions of dollars in highly sophisticated research staff and facilities. Thus the nature of the NIH mission places it in a position different from that of the other Federal agencies, since there simply are fewer small firms engaged in basic biomedical research business.

We are prepared, nevertheless, to make every effort to meet the set-aside requirements stipulated in S. 881. We can say, however, with a degree of certainty, that it is very unlikely we would be able to meet the 3-percent set-aside cited in the House bill.

In addition to our concern about the magnitude of the set-aside, we support the other amendments to H.R. 4326 that have already been proposed by speakers prior to myself. We would make one other suggestion and that is to recommend a less rigid, three-phase structure for the SBIR program that permits longer phases, as well as the option of partial agency funding at the point at which commercialization occurs.

We can envision a number of cases in which a relaxed structure would permit broader participation in the program by the small business community. Small business proposals that NIH could likely fall within an area defined as stage 3 of the bills. These include vaccines and certain anticancer drug development initiatives.

Third, we are concerned that there appears to be a number of ways potential applicants could meet the letter of the law but fail to fulfill the spirit of the SBIR program and, in so doing, engage in real or apparent abuses that would erode public confidence in the endeavor: One, nonbiomedical research companies could try to qualify for funding by placing an overlay of scientists in their structure but still lack the real manpower or facility capability to pursue high quality basic biomedical research; two, universities and hospitals which do have the requisite scientific resources could establish subsidiary business corporations; and three, small businesses with insufficient research resources may simply contract out to universities and hospitals all or most of the research funded under the set-aside.

Each of the situations would result in a probable increase in research costs and would not truly accomplish one of the main objectives of the SBIR program increased employment.

We believe that these problems can be addressed through regulations, perhaps, as well as through legislation.

Finally, the committee asked that we address the Schmitt amendment to S. 881. That amendment puts a cap on the amount of basic research funds that can be diverted to the SBIR program. Since NIH's primary purpose is to encourage and support basic research, we are in tune with the amendment's objective. But as a practical matter, it is often difficult to clearly distinguish basic and applied research.

Moreover, since the preponderance of NIH awards are for basic research, the impact of any SBIR set-aside must fall predominantly on our basic research programs. We will, however, try to insure that the set-aside is not disproportionately borne by basic research.

In conclusion, we support the passage and provisions of S. 881. We are prepared to increase our current efforts to involve small business in our programs and we will make every effort to make the small business innovation research program a success.

Thank you.

[The prepared statement of Mr. Kirschenmann follows:]

STATEMENT

BY

HENRY G. KIRSCHENMANN, JR.

DEPUTY ASSISTANT SECRETARY FOR GRANTS AND PROCUREMENT
DEPARTMENT OF HEALTH AND HUMAN SERVICES

BEFORE THE

HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

TUESDAY
JANUARY 26, 1982

Mr. Chairman and members of the Committee on Science and Technology:

The Department of Health and Human Services appreciates this opportunity to express our views on H.R. 4326, the "Small Business Innovation Development Act," and the Senate counterpart, S. 881, as passed by the Senate. Both of these bills are designed "to amend the Small Business Act to strengthen the role of small innovative firms in federally funded research and development, and to utilize federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the nations economy." The Department of Health and Human Services recognizes the important role in innovation played by small businesses and supports the basic concept of an SBIR Program.

First, let me describe what we are doing to assist small business. The Department of Health and Human Services has traditionally made special efforts to encourage the involvement of small businesses in our programs, including the R&D area. We have consistently met and exceeded our small business goals and we will continue to extend our efforts. The Department's principal research supporting agency is the National Institutes of Health. NIH carries out its research program principally through the award of grants to universities, hospitals, and nonprofit institutions. It also awards research contracts; in FY 80, NIH awarded approximately $400 million for R&D contracts. A considerable portion of this sum, however, funded clinical trials, an area of research which is mostly inapplicable to small business set-asides. Nevertheless, $31 million was awarded to small businesses in open competitions, and $3 million more was awarded from set-asides for small and minority businesses. The majority of these contracts have resulted from competition with all sectors of the biomedical research community, others are the result of unsolicited proposals and special set-asides for small or disadvantaged business.

The NIH has made a particular effort to search out and identify small R&D firms to participate in its mission. It has done so through general "sources sought" announcements in the Commerce Business Daily (CBD) requesting firms to provide it with resumes of capabilities in relevant fields; active participation at a number of meetings cosponsored by the Small Business Administration and the National Science Foundation in various parts of the country aimed at encouraging small business to participate in Government programs; and solicitation in the CBD and its own publication, the NIH Guide for Grants and Contracts for sources and proposals for specific procurements.

In addition, NIH encourages individual representatives of small businesses to contact staff in the Office of the Director, or the various individual components. These individual contacts result in the identification of specific program areas in which the firm may have the competence to compete for certain procurements, and its eligibility for the small business set-aside program. Each program unit maintains source lists of small firms that might be competent to provide certain types of research and research support. These source lists are augmented by frequent "sources sought" announcements that have as their intent the identification of additional small firms in order to determine whether a particular set-aside may be appropriate. Staff of the Small Business Administration participate in this process.

Recently, the NIH has gone further; it is looking anew at potential areas which can be reserved for small businesses before the planning for the procurement process has begun. For example, substantial opportunities may exist for small businesses to provide data support functions for multi-institutional clinical trials. It has also attempted to upgrade subcontracting opportunities for small and disadvantaged firms in accordance with the provisions of P.L. 95-507.

That portion of the Department's research program which is carried out under contract, however, is relatively modest. As I have noted earlier, the preponderance of its program is conducted through grants via the competitive review system. Until now, only nonprofit organizations could compete for these awards. That restriction recently was removed, permitting small as well as large for-profit organizations to submit investigator-initiated research proposals and to compete for the approximately $2.0 billion of research grants awarded annually. This action opens the doors of opportunity to all who can make a contribution, the only limitation being the ability to perform quality research. We believe this offers an excellent, voluntary opportunity for small businesses in the biomedical area to demonstrate their initiative and express their creativity, and to participate fully in the Department's major research programs while effectively advancing the goals of the Department of Health and Human Services.

The NIH is preparing to advertise widely (through the NIH Guide for Grants and Contracts, and the Commerce Business Daily) in order to implement the new Departmental policy which opens eligibility for grant awards to for-profit organizations. NIH also intends to solicit nominations and volunteers from the for-profit sector for inclusion on its scientific peer review groups. The additional anticipated workload and the need for the expertise of scientists with orientation toward the for-profit sector requires this addition to these review bodies.

These initiatives will be extended in order to implement the SBIR Program. Staff of the NIH are in the process of summarizing information on small businesses with expertise in the biomedical research area. If as the Administration recommends, the SBIR Program proposed in S. 881 becomes law, the NIH will arrange regional conferences with representatives of the small business community in the biomedical research area in order to describe in detail the nature and extent of the opportunities. The NIH will publish an open Request for Applications (RFAs) which will require only relevance to the NIH mission and to the SBIR Program. In addition, the NIH will publish specific RFAs, describing discrete scientific program opportunities which appear to be relevant to known biomedical expertise of the small business community. Those applications deemed sufficiently meritorious will be awarded as grants or cooperative agreements. The NIH also will prepare and advertise requests for statements of capabilities from small businesses in specific areas. Adequate response from the small business community , followed by proposals of merit, may lead to SBIR contract awards. The initial review groups of the NIH Division of Research Grants and of the funding institutes, augmented with additional expertise from the for-profit sector, will be utilized to review SBIR applications for scientific merit.

Now I would like to comment on the bills being considered by the Committee. In testimony on the "Small Business Innovation Research Act" before the Senate and House Small Business Committees, we expressed concern that our experience in attempting to identify small businesses through our sources sought announcements and conferences indicates a relative paucity of small businesses which possess biomedical research capabilities, especially in the basic science areas. To be specific, 77 small businesses were active as NIH contractors in FY 1980. About 100 additional ones have reached the central NIH source list as the result of small business conferences, solicitations, direct contacts, and other mechanisms. In addition to this 177, there are a small number of other small firms which have been NIH contractors at one time but are not at present. It is noteworthy that many small firms have contacted NIH in the past but have failed either to compete successfully for funding or to convince program officials that their proposals meet NIH needs.

We believe that it is unrealistic to assume that hundreds of new firms in the area of biomedical research would undertake to apply for the relatively small awards typical in SBIR type programs as would be the case under H.R. 4326. We base this belief on the fact that the existing private sector health research effort is concentrated for the most part in larger firms, and that the nature of this research may require, as it does in the area of drug development, an investment in the millions of dollars and highly specialized research staff and facilities. The nature of the NIH mission places it in a position different from that of other Federal agencies since there simply are fewer small firms engaged in the basic biomedical research business. Looking at the experience of the National Science Foundation in this area increases our concern. For example, NSF recently solicited proposals in a new category called "genetic engineering," but, of the nearly 700 proposals submitted for the SBIR Program generally, only three proposals were in this new area.

We are prepared, however, to make every effort to meet the set-aside requirements stipulated in S. 881. We can say with a degree of certainty, that in the case of the House bill, it is very unlikely that we would be able to meet successfully a three percent set-aside requirement.

In addition to our concern about the magnitude of the set-aside in H.R. 4326, we also wish to suggest several amendments to the bill. We believe the House bill should exclude, as does the Senate bill, intramural research from the base against which the set-aside is calculated. This base should be the budget for extramural research and development. Many of an agency's R&D activities can be performed intramurally, and funds available for these often unique tasks should not be diminished unless the agency's mission can be served better by the private sector.

We would also recommend a less rigid three-phase structure for the SBIR Program that permits longer phases, as well as the option of partial agency funding at the point at which commercialization occurs. We can envision a number of cases in which such a relaxed structure would permit broader participation in the program. Of the small business proposals that NIH could likely fund, many fall within the range defined at Phase Three. These areas include orphan drugs, vaccine, and certain anticancer drug development initiatives.

Thirdly, we are concerned that there appear to be a number of ways potential applicants could meet the letter but fail to fulfill the spirit of the SBIR Program and, in so doing, engage in real or apparent abuses that would erode public confidence in the endeavor:

- o Non-biomedical research companies could try to qualify for funding by placing an overlay of scientists in their structure but still lack the real manpower or facility capability to perform high quality basic biomedical research;

- o Universities/hospitals which do have the requisite scientific resources could establish subsidiary business corporations;

- o Small businesses with insufficient research resources may simply contract out to universities/hospitals all or most of the research funded under the set-aside--with a probable increase in research costs.

We believe, however, that these potential problems can be addressed through application of existing regulations, plus regulations developed to implement this bill.

Finally, you have asked that we address the Schmitt amendment to S. 881. That amendment puts a cap on the amount of basic research funds that can be diverted to the SBIR Program. Since NIH's primary purpose is to encourage and support basic research, we are in tune with the amendment's objective but as a practical matter, it is often difficult to clearly distinguish between basic and applied research. Moreover, since the preponderance of NIH awards are for basic research, the impact of any SBIR set-aside must fall predominately on our basic research programs. We will, however, insure that the set-aside is not disproportionately borne by basic research.

In conclusion, we support passage of S. 881 and are prepared to increase our current efforts to involve small businesses in our programs. We will make every attempt to make the Small Business Innovation Research Program a success.

Mr. FLIPPO. Thank you very much. Mr. Brown.

Mr. BROWN. Could I just ask Mr. Evans and Mr. Rauch if they have any estimates as to the cost of administering the program at the level contemplated in the Senate bill, the 1-percent bill? I recall in one of your statements some remark about fundng 600 proposals, which would mean soliciting probably several thousand to get the 600 and the cost of administering that program it seems to me could be fairly substantial.

Mr. EVANS. Yes, sir. We made some cost estimates based upon the only example we had, which was the experience of the National Science Foundation. We also based it on the presumption that we would have all our centers involved because of the range of disciplines that they have and the diversity of programs they conduct, and that the program would be conducted at our centers. On that basis we estimated the cost would be approximately $1 million under S. 881 and about double that under H.R. 4326. Taking the assumptions of the size of the funding action, it would generate under H.R. 4326, within a 4- or 5-year period, a substantial volume of action. So, it would involve the effort of developing solicitations, of receiving substantial numbers of proposals, of going through the review process, making a selection after evaluation, of conducting awards, and then administering a growing number of separate small contract actions.

Mr. BROWN. You are saying you could do that with $1 or $2 million?

Mr. EVANS. We believe so, sir.

Mr. BROWN. Mr. Rauch, your agency has had considerable experience administering small grant programs.

Mr. RAUCH. Yes, sir. We took a shot at it, also. I would like to address principally the oversight activities, the management of the program initially. And again using figures from the Congressional Budget Office as our assumptions for S. 881, at the 1-percent level we estimate some $425,000 in so-called overhead, oversight, to provide the overall management of such a program.

Unlike NASA, we were unable to accurately identify all the costs and the manpower estimates that might be associated with evaluating a very large number of anticipated proposals.

Our experience, for example, a number of years ago with the solar heating and cooling demonstration program, where we advertised rather widely the availability of that program and those funds, I think the first round generated well over 1,200 proposals and we were forced in that instance, because of limitations, both programmatically and administratively, to ask NASA, of all agencies, to assist us in fully implementing that program.

We were resource constrained, frankly, sir. We are unable at this time to give you a rational estimate of the total impact. Any impact, of course, would have to be handled through the normal budgetary channels with any such legislation as this.

Mr. **Brown**. You are saying you can't give us a good figure at this point.

Mr. **Rauch**. That is right. I can only give you the overhead figure.

Mr. **Flippo**. Thank you.

First of all I would like to request that each of you submit for the record the current working definition of a small business that is being used by your agency. And if you would, point out any changes or any comparisons with the definition in the Senate bill and in the House bill.

The authority for the Small Business Administration to set size standards is contained in 15 U.S.C. Section 632(a). Their specific definitions of small businesses are codified in 13 CFR 121.3-1. The Department of Energy uses these definitions in determining eligibility for small businesses. Although both S. 881 and H.R. 4326 had a section entitled "Definitions," the subject of "small business" was not addressed in either case.

Dr. Langenberg, do you think the NSF SBIR program is adaptable to the missions of the other agencies?

Mr. **Langenberg**. Yes, I do think it is adaptable. As I mentioned earlier, I don't think it is optimally taken over in precisely the form in which we use it. We designed our program to fit general NSF policies and procedures and to suit, for example, the particular way in which we operate the peer review system. Other agencies do things differently, but I think programs similar to ours but adapted to other agencies' ways of doing business could be designed.

Mr. **Flippo**. For DOE and NASA, I believe you have addressed that already, but I wonder about the other agencies. Do you feel your agency could structure a similar program more appropriate to your specific mission needs?

Mr. **Rauch**. I think, in the Department of Energy, sir, we would look to our research and development activities, many of which are carried out predominantly in Government-owned, contractor-operated facilities which are peculiarly necessary for, for example, our nuclear weapons program, our nuclear R. & D. program, where a fair bit of our budget is, in a sense, precommitted to those activities which are long-term, high-risk, capital and facility intensive kinds of programs. We would be forced to then examine the balance of our R. & D. efforts and attempt to structure meaningful solicitation requirements for those programmatic requirements for which we have significantly less funding than our total R. & D. budget.

This would clearly have an impact, as the committee surely recognizes, it has had an impact in years past. For example, the fact the Department of Energy did not indeed voluntarily 2 years ago on its own establish an identical SBIR program. Even though we intended to attempt to do so, funding constraints and other such constraints dictated something quite different.

We have had other initiatives that were analogous, unsolicited proposal reserves, for example. We have attempted to negotiate within a programmatic area a reserve of funding identified specifically for small businesses, await their unsolicited, but in this case solicited in a general sense, proposals and attempted to assure that we funded those that were meritorious.

In those instances where adequate proposals were not received, we were able to revert the funds back to other programmatic needs.

I, therefore, think the Department would have to examine its activities at a fairly detailed level to see where adequate statements or requirements could be developed to which the small business community could respond.

I believe the program would be tailored but definitely in its efforts in that regard. However, I think one can carefully structure such a program.

Mr. EVANS. The closest analogy I can draw to what we are presently doing, is in the area of our research technology objectives and plans, and here I would contrast it slightly with the phases of this bill and the objectives as I interpret them. We have approximately 700 to 800 different categories in our research and technology objectives and plan that we go out and seek public proposals on each year. They are pinpointed more to future and specific needs of NASA than they are to the broad generic areas that NSF's mission addresses.

We were allowed to focus more sharply upon the needs of NASA within its mission. We were then allowed to modify the phases. For instance, as we conduct our own phase A efforts where we determine the feasibility of concepts, ideas, and techniques; the phase B efforts where we go through further definition of them; we could, indeed, structure them in that manner. We find, for example, that the average contracts we make in aeronautics and space technology are over $100,000 because in our experience you can't buy much for $25,000 to $30,000.

Two other elements differ in what we are presently doing, however, in my understanding of this bill. To maximize the benefit of the efforts we make, particularly in our early phase A events, there is considerable dialog, interchange, and discussion, between NASA scientists and engineers, and those with whom we are contracting. It helps to sharpen the focus and increases the understanding of our objectives which we feel makes for more responsive research. By responsive research, I am talking to NASA's specific needs. We also seek to obtain a product from this which we can then build upon. Notice that that moves us in the direction of contracts, not grants, where a grant by law is defined principally for support, stimulation, and assistance, with no Government involvement and no direct benefit to the Government. This is not a role we have been in with the exception, I believe, under title IV, section 4 of the Space Act, to a very minor extent in universities and nonprofits, but that is maybe 1 percent of our total endeavor. So within that context, yes, we could do this. It would be a significant expansion over what we are doing; 14.9 percent of our current efforts last year in aeronautics and space technology went to small business; 29.8 of similar efforts under space tracking and data acquisition went to small business; and 6.9 percent under space and terrestrial applications went to small business.

Our difficulty lies in looking at the total appropriation we have at the present time, the lack of flexibility we have, particularly where the space transportation system currently embraces well over 50 percent of the total appropriation. I sometimes feel I'm in the position of a gnat trying to swallow an elephant in trying to find resources for programs of this nature.

Mr. FLIPPO. In your testimony to the committee you state the full set-aside percentage of H.R. 4326 would actually amount to 32 percent of all uncommitted funds.

Since H.R. 4326 only mandates a maximum of 3 percent of your R. & D. budget, why this substantial difference?

Mr. EVANS. We computed this on fiscal year 1980 data, Mr. Chairman, so we would have actuals. We also took the 1980 authorization and then took from that the intramural research which left us a balance contracted with the private sectors. From that we examined the portion of the balance which we would contract to the private sector, over which we feel we have very limited discretion because it goes to funding prior authorized programs, the Shuttle, expendable launch vehicles, and the like. We identified by contract which ones those were and what were the amounts and felt, on that basis, we had little discretion in the application of that money to a program of this nature.

We then looked at the remaining balance and from that remaining balance we deducted the research and development efforts we are currently performing with small business on the assumption and with the understanding that this proposed program was a separate and distinct program from our present efforts. That left us a relatively small amount which under the House bill I believe in the fifth year would be about 32 percent of the remaining funds in R. & D. over which we felt we had a reasonable measure of discretion.

Mr. FLIPPO. You feel that since your agency has been making a substantial effort in the small business area already that you would be somewhat penalized as a result of that effort to comply? If you have to add on to those funds already? If you had not been doing anything in small business, you would still only have to——

Mr. EVANS. It is an unknown area. We don't know the size of that community. We do feel rather inhibited within our present budget structure of line items as to where we can draw funds. Of course I face the same dialog with all our program associate administrators in terms of the programs they carry to come to fruition, they seem to support and the like, versus the levies this would put on them.

Mr. FLIPPO. From where will you take the funds?

Mr. EVANS. At this stage honestly I don't know. I'm certain we would have extensive discussions with Mr. Newman, our comptroller. I have looked at the fiscal year 1982 operating plans that have just been submitted to the House and the Senate and under S. 881 it is a relatively small amount and something with which we could live.

Under H.R. 4326 it does present a problem of different magnitude. Of course projected out to the fifth year under H.R. 4326, I don't know. Something would have to give.

Mr. FLIPPO. Thank you.

I thank the witnesses for your testimony. We appreciate your being here and giving us your points of view on this important matter.

Our final witness for the day, Mr. Morton Myers, Director, Program Analysis Division, General Accounting Office.

STATEMENT OF MORTON MYERS, DIRECTOR, PROGRAM ANALYSIS DIVISION, U.S. GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY GWENDOLYN B. MOORE, POLICY ANALYST; AND DAVE BALDERSTON, EVALUATOR

Mr. MYERS. Might I introduce my colleagues this morning? Ms. Gwendolyn Moore was in charge of the team that did the work in the area of small business innovation for the General Accounting Office, and to her right is Dave Balderston from our Program Information Unit.

It is clear from the work we have done in the area of small businesses and innovation that small businesses have been important contributors to the innovation process in this country. While we don't feel we are able to generalize from the existing evidence to specify the level of small businesses' future contributions, we found no evidence to suggest they might be less important in the future than they have been in the past.

Both H.R. 4326 and S. 881 call for the creation of small business innovation research programs when agency research or research and development budgets meet certain thresholds. The framework for the SBIR's provided by the bills is sufficiently flexible to allow agencies to design small business innovation research programs that could address a number of the conditions that we have found to be important in fostering small business innovation. However, a number of questions having to do with funding for SBIR programs and implementation strategies to be employed in establishing the programs deserve attention.

One condition necessary to foster small business innovation is encouraging the exploitation of technological opportunity. Both H.R. 4326 and S.881 would allow the design of small business innovation research programs to do this. They would also permit programs to be designed that could stimulate the creation of technological opportunity or augment existing technological opportunity—an important condition in fostering small business innovation.

These conditions could be addressed by agencies soliciting research proposals to seek technological solutions in problem areas the agencies specify. In applying existing methods or technologies in solving new problems, existing or perhaps new firms would be exploiting technological opportunity. Firms responding to such a solicitation might also be stimulated to augment existing technology or to create new technologies in order to meet solicitation and program requirements.

Another necessary condition is that firms undertaking innovation must have adequate managerial and technical capacity. Although we recognize that it is difficult to develop criteria that would identify or predict such capacity, the acquisition process outlined in these bills would at least provide the opportunity to obtain information on a firm's technical and organizational capabilities. It is our view that participating firms could benefit from this process in judging their own technical and managerial well-being.

The framework of both of these bills would also allow SBIR programs to be designed to insure financial and human resources adequate to support innovation. This would occur in two ways. First, SBIR programs would provide successful applicants with specific financial support, thus meeting this condition quite directly. Second, the bills would allow programs to be designed to address this condition indirectly through "phased support."

The three phases of support outlined in the bills coincide with the three stages of the innovation process as we have defined it—invention, development, and commercialization. Under the bills, the first phase of support would provide funds to investigate an idea's technical feasibility, an activity that corresponds to the invention stage in the innovation process. The second phase would provide funds to develop and explore the concepts determined to be technically feasible in phase one. The third phase, moving the invention into commercialization, would encourage third-party follow-on funding to commercialize the results of inventive and developmental activities. Until an innovation has been commercialized and put to use—whether in the private or the public sector—the economic benefits of innovation do not accrue to individuals or to society.

To fund the SBIR programs called for in the bills, each Federal agency meeting certain threshold criteria would be required to allocate a minimum percentage of research or research and development funds for expenditure through an SBIR program. It is our opinion that it would be better if the funding were more targeted and more flexible than currently exists in the bills. One way to accomplish this would be to authorize SBIR's for each agency with large research and development programs, with funding levels set through the normal budget process. This would allow funding for some SBIR programs to be set at higher or lower levels, depending on individual agency circumstances, and also address concerns that SBIR funding requirements would have an adverse effect on already constrained basic research budgets.

As currently written, H.R. 4326 would require 13 agencies to establish SBIR programs. Based on fiscal year 1982 R. & D. obligations data, we estimate that funding through SBIR's established through H.R. 4326 would be about $200 million in the first year of operation of the programs, $400 million in the second year, $800 million in the third year, and $1.2 billion in the fourth and subsequent years. Using the Senate formula, we estimate funding through the program at some $60 million for the first year, $175 million for the second year, and $280 million for the third and subsequent years.

You asked that we comment on the provision in S. 881 that would limit funds taken from basic research and research in Government-owned, contractor-operated facilities [GOCO's] to support SBIR programs. That provision would limit to 1 percent funds from those sources used for SBIR purposes. However, if concern is with unintended effects of the SBIR programs on funding for basic research, maximum flexibility and control over funds taken from basic research to support SBIR's can be best achieved by funding SBIR's through the normal authorizations and appropriations process rather than by limiting the amount of the set-aside as this provision would do.

In addition, the language in S. 881 to establish funding levels for SBIR programs is complex and difficult to follow. A number of steps would be required to calculate the "amount available for obligation" under the programs. First, a formula would establish a ratio between research by specified performers and all agency research using the latest actual NSF data available. That ratio is then applied to the total amount of funds an agency has "available for obligation for research or research and development" in a given year. However, the formula does not reflect the provision to limit to 1-percent the amount of basic research and GOCO funds used to meet SBIR funding requirements. This would require agencies to recalculate funding for SBIR's after application of the formula to account for the 1 percent limitation. We urge that the language of the legislation be clarified to prevent possible misinterpretations to ensure that the desired result of the funding provisions is accomplished.

H.R. 4326 and S. 881, although quite similar in purpose and objectives, do employ different strategies for implementation. In the House version, the Small Business Administration [SBA] is designated responsibility for operational, monitoring, and reporting activities, while the Office of Science and Technology Policy [OSTP] is designated the same monitoring and reporting duties as SBA. The Senate version of the bill charges OSTP with monitoring and reporting responsibilities, with SBA performing the operational duties. We prefer S. 881 because it avoids duplication of responsibilities between SBA and OSTP, and separates oversight responsibilities from operational responsibilities.

And, finally, I would like to comment on a provision included in S. 881, which is not included in H.R. 4326, that would require the GAO to submit a report to the Congress 2 years after enactment of the act on the "quality, quantity, and nature of the basic research" conducted under the act. GAO's existing authority to conduct reviews of Federal R. & D. procurement and contracting functions would allow us to examine the impact of SBIR programs without need for legislating additional authority. In addition, there appears to be some overlap between the study that would be required by GAO and the responsibilities outlined for OSTP and SBA to "survey and monitor all phases of the implementation and operation" of SBIR programs. Hence, we prefer the House bill in this regard because it does not establish a statutory report requirement for GAO.

However, if it should be deemed essential to legislate a reporting role for GAO under this legislation, we would strongly urge that review and reporting responsibilities between OSTP, SBA, and GAO be clearly delineated and that the following language be substituted for the provision currently contained in S. 881:

> The Comptroller General shall, no later than 3 years following enactment of the Small Business Innovation Research Act of 1981, report to the Senate and House of Representatives on the implementation of and nature of research or research and development conducted under this act, including the judgment of the departments and agencies involved as to the effect of this act on their overall basic research programs.

I will make a third offer if these two prove unacceptable. We would be happy to work with this Committee to draft language to specify GAO's role under these bills, should such a role be deemed necessary.

With that, Mr. Chairman, we will be happy to respond to any inquiries you might have at this time.

[The prepared statement of Mr. Myers follows:]

U.S. GENERAL ACCOUNTING OFFICE
WASHINGTON, D. C. 20548

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STATEMENT OF

MORTON A. MYERS

DIRECTOR, PROGRAM ANALYSIS DIVISION

BEFORE THE

HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

ON

H.R. 4326 - "SMALL BUSINESS INNOVATION DEVELOPMENT ACT OF 1981"

Mr. Chairman and Members of the Committee:

We are pleased to be here today to discuss GAO's work on small businesses and innovation and to comment on the Small Business Innovation Development Act of 1981, H.R. 4326, as reported by the House Small Business Committee. In addition, we will comment on selected sections of S. 881, the Senate counterpart measure passed by the Senate on December 8, 1981. Both of these bills would increase the use of small businesses in meeting Federal research and development needs by the creation of individual, agency-sponsored, small business innovation research programs (SBIRs) to foster innovation by small businesses.

SMALL BUSINESSES AND INNOVATION

It is clear from the work we have done in the area of small businesses and innovation that small businesses have been important contributors to the innovation process in this country.

The objective of our work over the last 2 years has been to construct a comprehensive picture of small business innovation. To do this, we have addressed four questions: 1/

--What conclusions can be drawn from the existing literature about the contributions of small businesses to invention and innovation?

--What factors influence the environment within which small businesses innovate?

--How do small businesses act as innovators within that environment?

--How could an understanding of the answers to these two questions contribute to Federal policymaking efforts to support small businesses as innovators?

We found, based on an analysis of the existing literature, that small businesses have been important contributors to invention and innovation in this country--both in terms of the amount and the significance of inventions and innovations produced. While we were not able to generalize from the existing evidence to specify the level of small businesses' future contributions, no evidence was found to suggest that they might be less important to invention and innovation in the future than they have been in the past.

Further, we found that the environment within which small businesses innovate is influenced by three kinds of factors:

--broad economy-wide factors, such as tax policy;

--factors specific to individual industries, such as the rate of growth of the industry; and

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1/Detailed information addressing these questions is presented in, "Small Businesses Are More Active As Inventors Than As Innovators In the Innovation Process," U.S. General Accounting Office, PAD-82-19, December 31, 1981; and in "Consistent Criteria Are Needed to Assess Small Business Innovation Initiatives," U.S. General Accounting Office, PAD-81-15, July 7, 1981.

- --the characteristics of individual firms, including the entrepreneurial nature of key individuals within it.

Based on our understanding of (1) the factors that influence small-business innovation and (2) the activities of small businesses as innovators, we identified the conditions that are necessary to foster innovation by small businesses. Actually, there are three sets of conditions: those that are necessary for small-business innovation to occur, those that are important but not as necessary, and those that are desirable but not as important.

Analysis of the conditions that are necessary, important and desirable for small businesses to be active in innovation enabled us to develop criteria to judge the extent to which Federal initiatives meet these conditions. We recommended that the Congress use the criteria to assess the degree to which proposed initiatives would enhance the conditions that foster innovation by small business.

Briefly, for a Federal initiative to help to meet these necessary conditions, it should

- --encourage the exploitation of technological opportunity,
- --ensure the managerial and technical capacity of firms undertaking innovation,
- --ensure the adequacy of financial and human resources throughout the innovation process, and
- --promote innovation in technologies and industries in which small businesses can be expected to assemble requisite resources.

Federal initiatives that are to address the conditions that are important but not as necessary to foster small-business innovation should

--stimulate the creation and augmentation of technological opportunity, and

--increase the availability of financial and human resources.

And, finally, if a Federal initiative is to help meet the conditions that are desirable but not as important in fostering small businesses in innovation, it should

--address enough individual incentives and barriers to influence the balance between them positively.

H.R. 4326 and S. 881

Both H.R. 4326 and S. 881 call for the creation of small business innovation research programs when agency research or research and development budgets meet certain thresholds. The framework for the SBIRs provided by the bills is sufficiently flexible to allow agencies to design small business innovation research programs that could address a number of the conditions that we have found to be important in fostering small-business innovation. However, a number of questions having to do with funding for SBIR programs and implementation strategies to be employed in establishing the programs deserve attention.

SBIRs Could Address Important Conditions

One condition necessary to foster small-business innovation is encouraging the exploitation of technological opportunity. These bills would allow the design of small business innovation research programs to do this. They would also permit programs to be designed that could stimulate the creation of technological opportunity or augment existing technological opportunity--an important condition in fostering small-business innovation.

These conditions could be addressed by agencies soliciting research proposals to seek technological solutions in problem areas the agencies specify. In applying existing methods or technologies in solving new problems, existing or perhaps new firms would be exploiting technological opportunity. Firms responding to such a solicitation might also be stimulated to augment existing technology or to create new technologies in order to meet solicitation and program requirements.

Another necessary condition is that firms undertaking innovation must have adequate managerial and technical capacity. Although we recognize that it is difficult to develop criteria that would identify or predict such capacity, the acquisition process outlined in these bills would at least provide the opportunity to obtain information on a firm's technical and organizational capabilities. It is our view that participating firms could benefit from this process in judging their own technical and managerial well-being.

The framework of both of these bills would also allow SBIR programs to be designed to ensure financial and human resources adequate to support innovation. This would occur in two ways. First, SBIR programs would provide successful applicants with specific financial support, thus meeting this condition quite directly. Second, the bills would allow programs to be designed to address this condition indirectly through "phased support."

The three phases of support outlined in the bills coincide with the three stages of the innovation process as we have defined it--invention, development, and commercialization.

Under the bills, the first phase of support would provide funds to investigate an idea's technical feasibility, an activity that corresponds to the invention stage in the innovation process. The second phase would provide funds to develop and explore the concepts determined to be technically feasible in phase one. The third phase, moving the invention into commercialization, would encourage third-party follow-on funding to commercialize the results of inventive and developmental activities. Until an innovation has been commercialized and put to use--whether in the private or the public sector--the economic benefits of innovation do not accrue to individuals or to society.

Funding for SBIR Programs

To fund the SBIR programs called for in the bills, each Federal agency meeting certain threshold criteria would be required to allocate a minimum percentage of research or research and development funds for expenditure through an SBIR program. It is our opinion that it would be better if the funding were more targeted and more flexible than currently exists in the bills. One way to accomplish this would be to authorize SBIRs for each agency with large research and development programs, with funding levels set through the normal budget process. This would allow funding for some SBIR programs to be set at higher or lower levels, depending on individual agency circumstances, and also address concerns that SBIR funding requirements would have an adverse affect on already constrained basic research budgets.

As currently written, H.R. 4326 would require 13 agencies to establish SBIR programs. Based on FY 82 R&D obligations data, we estimate that funding through SBIRs established through H.R. 4326 would be about $200 million in the first year of operation of the programs, $400 million in the second year, $800 million in the third year, and $1.2 billion in the fourth and subsequent years. Using the Senate formula, we estimate funding through the program at some $60 million for the first year, $175 million for the second year, and $280 million for the third and subsequent years. 1/

You asked that we comment on the provision in S. 881 that would limit funds taken from basic research and research in government-owned, contractor-operated facilities (GOCO's) to support SBIR programs. That provision would limit to one percent funds from those sources used for SBIR purposes. However, if concern is with unintended effects of the SBIR programs on funding for basic research, maximum flexibility and control over funds taken from basic research to support SBIRs can be best achieved by funding SBIRs through the normal authorizations and appropriations process rather than by limiting the amount of the set-aside as this provision would do.

In addition, the language in S. 881 to establish funding levels for SBIR programs is complex and difficult to follow. A number of steps would be required to calculate the "amount

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1/ Under H.R. 4326, qualifying agencies, based on National Science Foundation FY82 R&D obligations data, are DOD, NASA, DOE, HHS, EPA, NRC, AID, VA, and the Departments of Agriculture, the Interior, Transportation, and Commerce. Under S. 881, DOD, NASA, DOE, HHS, and NSF would qualify.

available for obligation" under the programs. First, a formula would establish a ratio between research by specified performers and all agency research using the latest actual NSF data available. That ratio is then applied to the total amount of funds an agency has "available for obligation for research or research and development" in a given year. However, the formula does not reflect the provision to limit to one percent the amount of basic research and GOCO funds used to meet SBIR funding requirements. This would require agencies to recalculate funding for SBIRs after application of the formula to account for the one percent limitation. We urge that the language of the legislation be clarified to prevent possible misinterpretations to ensure that the desired result of the funding provisions is accomplished.

Implementation of the SBIR Programs

H.R. 4326 and S. 881, although quite similar in purpose and objectives, do employ different strategies for implementation. In the House version, the Small Business Administration (SBA) is designated responsibility for operational, monitoring, and reporting activities, while the Office of Science and Technology Policy (OSTP) is designated the same monitoring and reporting duties as SBA. The Senate version of the bill charges OSTP with monitoring and reporting responsibilities, with SBA performing the operational duties. We prefer S. 881 because it avoids duplication of responsibilities between SBA and OSTP, and separates oversight responsibilities from operational responsibilities.

And, finally, I would like to comment on a provision included in S. 881, which is not included in H.R. 4326, that would require the GAO to submit a report to the Congress 2 years after enactment of the Act on the "quality, quantity, and nature of the basic research" conducted under the Act. GAO's existing authority to conduct reviews of Federal R&D procurement and contracting functions would allow us to examine the impact of SBIR programs without need for legislating additional authority. In addition, there appears to be some overlap between the study that would be required by GAO and the responsibilities outlined for OSTP and SBA to "survey and monitor all phases of the implementation and operation" of SBIR programs. Hence, we prefer the House bill in this regard because it does not establish a statutory report requirement for GAO.

However, if it should be deemed essential to legislate a reporting role for GAO under this legislation, we would strongly urge that review and reporting responsibilities between OSTP, SBA, and GAO be clearly delineated and that the following language be substituted for the provision currently contained in S. 881.

> "The Comptroller General shall, no later than three years following enactment of the Small Business Innovation Research Act of 1981, report to the Senate and House of Representatives on the implementation of and nature of research or research and development conducted under this Act, including the judgement of the departments and agencies involved as to the effect of this Act on their overall basic research programs."

I would be happy to answer any questions you may have at this time.

Mr. FLIPPO. Dr. Prager pointed out 2 years following enactment would be too soon since projects would not have completed phase II at that point. The small business share of Federal R. & D. has directly been cited as being at 3 to 4 percent. First, do you believe this is accurate and would this figure include subcontract data as well?

Mr. MYERS. Mr. Chairman, that is a figure I have seen. It is a figure, unfortunately, that we do not have complete understanding of. I would point out statistics of this type are normally heavily dependent on the precise definition of what would qualify as a small business when they are being compiled. I don't have good information on that number. I am sorry.

Mr. FLIPPO. It would be an important piece of information to have, wouldn't it?

Mr. MYERS. Yes.

Let me make a more generic comment on what you might be getting into. One of the difficulties in achieving the objectives of these bills as I understand them is that there are a lot of unknowns in the area of small bussiness innovation. We do not know with any preciseness what exists in the way of untapped innovation out there either in the small business community or in big business. Those are the difficulties. It is one of the reasons we feel that you almost have a need for an experimental period to learn how to behave in this area.

That is why we prefer legislation with as much flexibility as possible during the early years of the effort, and then perhaps a set-aside at some given or known or constant rate for all agencies to adhere to might be more appropriate.

Mr. FLIPPO. Thank you very much for your testimony. We appreciate your being with us today. Your entire statement has been included in the record.

Mr. MYERS. Thank you, Mr. Chairman.

Mr. FLIPPO. The committee stands in recess until 9:30 tomorrow.

[Whereupon, at 12:35 p.m., the committee was recessed, to reconvene at 9:30 a.m., Wednesday, January 27, 1982.]

SMALL BUSINESS INNOVATION DEVELOPMENT ACT

WEDNESDAY, JANUARY 27, 1982

House of Representatives,
Committee on Science and Technology,
Washington, D.C.

The committee met, pursuant to notice, at 9:37 a.m., in room 2318, Rayburn House Office Building, Hon. Don Fuqua (chairman of the committee) presiding.

Mr. Fuqua. The committee will be in order.

Today we begin the second hearing on the bill H.R. 4326, the Small Business Innovation Act, which has been referred to this committee.

Today our first witnesses are Members of the House who have a particular interest in this bill. Our first witness will be Congressman John J. LaFalce, the chairman of the Subcommittee on General Oversight of the Small Business Committee, followed by Congressman Bedell of Iowa.

We will proceed. If it is agreeable with your schedules, we will go ahead and hear all of your testimony and then answer questions, because they may be relevant to each other's and you may want to comment.

At this time, John, we are happy to have you here and appreciate your interest in a subject that we have all been very interested and concerned about, and I know of your deep interest.

STATEMENTS OF HON. JOHN J. LaFALCE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK; HON. BERKLEY BEDELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IOWA; AND HON. J. WILLIAM STANTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OHIO

Mr. LaFalce. Thank you very much, Mr. Chairman, and members of this committee. I am very appreciative of your invitation to appear before the Science and Technology Committee on behalf of H.R. 4326, the Small Business Innovation Development Act, which is really a composite of the features of bills on innovation that were introduced by Congressman Berkley Bedell, Congressman Neal Smith, Congressman Jerry Lewis, and Congressman Bill Stanton. I have just been advised that Congressman Stanton will not be able to be here this morning, as was planned. He has submitted his testimony for the record.

Mr. Fuqua. We will make his testimony a part of the record.

Mr. LAFALCE. I am glad to see this committee giving this important bill such thorough consideration.

As you may recall, the White House Conference on Small Business strongly endorsed this legislation in January 1980, and the House Small Business Committee has been working over the past two Congresses to achieve its enactment.

Our committee set the stage for House consideration of the innovation bill last October by unanimously reporting H.R. 4326. The Senate has already passed its version of the innovation bill by a 90-to-0 vote.

The Small Business Innovation Development Act is long overdue. We have only to look at the scientific, technological, and economic challenges our Nation faces today to realize why this legislation is imperative. The warning signs are clear. We see:

A sharp drop in U.S. productivity. The rate of productivity for the United States has declined tenfold over the past decade and now lags far behind that of the rest of the world's major industrial nations.

A serious decline in the ability of the United States to innovate and to apply innovations for commercial and industrial purposes. Patent awards to U.S. nationals have been dropping over the past decade, while the number of innovative technology-based companies starting up is much less than a few years ago, according to a U.S. Commerce Department study.

Moreover, it is Japanese companies, not U.S. companies, that have been applying many American technological breakthroughs, like the transistor and the semiconductor. The Wall Street Journal reports that the Japanese are going a step further and are laying the groundwork to generate the technological innovation that they realize is essential for economic growth.

We ignore the Japanese at our own peril. As William Agee, chairman of the Bendix Corp., has warned:

> * * * 80 percent of the electronics patents in the last five years have been issued to Japanese companies, so they're getting ready [to compete] with products as well as processes. We should be very worried.

Inadequate research investment. American industry is more interested in short-term profits than in long-term investments in R. & D. As Robert H. Hayes and William J. Abernathy of the Harvard Business School have pointed out in their seminal article, "Managing Our Way to Economic Decline":

> * * * investment in both new equipment and R&D, as a percentage of GNP, was significantly higher twenty years ago than today * * * By their preference for servicing existing markets rather than creating new ones and by their devotion to short-term returns and marketing by numbers, many * * * [corporate managers] have effectively foresworn long-term technological superiority as a competitive weapon.

Statements by experts, including a recent article in the New York Times magazine saying:

> There are many scientific, technological, and economics experts who fear that the U.S. stands on the brink of * * * a [technological] decline because the nation's ingenuity, its ability to capitalize upon scientific findings and create a new technology that leads to new products is faltering.

Burton Malkiel, chairman of Princeton University's economics department, agrees. "There can be little doubt that the creative pulse of the country is slowing down," he says.

An all-out effort that utilizes all components of our national science system is required if we are to keep the United States innovative and our economy competitive and productive. We must draw on not only the universities, large corporations and research institutions, but on the small science and high-technology firms in this effort.

Indeed, the small science and high-technology firms are the key to keeping the United States the preeminent generator of innovation. A recent National Science Foundation study reported that on the basis of a sample of major innovations introduced to the market between 1953 and 1973, small firms were found to produce about 24 times as many major innovations per R. & D. dollar as large firms and 4 times as many as medium-sized firms.

Moreover, small science and high-technology companies are essential to rebuilding the U.S. economy. These firms have one of the fastest rates of growth in net employment, sales, exports, productivity, net revenues and tax dollars in the United States. We have already seen the tremendous boost they have provided to the economies of such states as Massachusetts, New Hampshire, North Carolina, and California.

Small businesses are the primary creators of the new jobs that our economy and our population so desperately need. According to Prof. David L. Birch of the Massachusetts Institute of Technology, two-thirds of the new jobs created between 1969 and 1976 were created by firms with 20 or fewer employees, and about 80 percent were created by firms with 100 or fewer employees.

Furthermore, many of the small business jobs are in the high-technology, high "thought content" area. Drawing from historical experience, Professor Birch notes:

> Just as we moved in the 1820's and the 1830's from being a basically agricultural society to being an industrial one, so now are we rapidly abandoning our heavy industrial base in favor of jobs that demand greater use of our minds and less of our muscle and dexterity.
>
> The transformation is thus a fundamental and far-reaching one. We are moving from manufacturing to services, from hardware to "thoughtware," from large-scale capital intensive companies to small-scale labor intensive companies, and from dependence on physical capital to dependence on human capital.

The Small Business Innovation Development Act is a crucial part of the effort to stimulate innovation and the firms that are the generators of innovation. The small science and high-technology firms play a unique role in our scientific and economic system by serving as a means of transferring the results of research occurring at the frontiers of knowledge to the marketplace.

This is very important to the university scientists and engineers who develop the innovative ideas. Many of the individuals who establish these firms are former academics or university researchers who have an idea that they feel can be commercially marketed.

As we know, small business and universities historically have worked together. One has only to look at the close relationship between the Massachusetts Institute of Technology and the route 128 high-technology complex around Boston. Closer to home, we have only to look at the National Science Foundation's highly successful small business innovation research program, on which H.R. 4326 has been modeled.

Over half of the small business recipients of the Small Business Innovation Research Awards under the NSF program are involved with universities, and most of them use university scientists and engineers as consultants. In some cases, there are joint university/small business R. & D. efforts. In other cases, small businesses use university facilities and special instrumentation. This cooperation must be fostered, especially if we are to develop and commercially market the new ideas, products, and processes that will allow us to retain our lead over foreign competitors.

The resources of the Federal Government must be involved in this effort. The Federal Government today spends $40 billion annually on R. & D. Most of that R. & D. money goes to universities, large companies, Government, and nonprofit research institutions. Unfortunately, small businesses, including small science and high-technology firms, receive a pittance—less than 4 percent of total Federal R. & D. funds.

Given small business' impressive rate of innovation and below-average R. & D. costs, it would be much more efficient and cost effective for the Federal Government to earmark a small percentage of its existing R. & D. budget to stimulate high-quality, wide-ranging, and unfettered innovation by small science and high-technology companies.

H.R. 4326 would do just that. The bill would have Government agencies with R. & D. budgets exceeding $100 million a year establish small business innovation research programs. All too often, small firms find it difficult to attract the private capital needed to develop a new idea or product. A small amount of Federal support to cover early development costs would be important in getting private follow-on support, essential for commercialization. The small percentage of the R. & D. budget earmarked to fund the small business innovation research programs and awards is not a diversion of R. & D. money; it is an investment in our future.

We can no longer afford status quo policies that ignore the innovative record and potential of small science and high-technology companies as our economy declines and as the Japanese prepare to overtake us technologically. The Small Business Innovation Development Act establishes a forward-looking, creative program to stimulate innovation. It also recognizes the limits on the Government's resources by providing for the wise and efficient use of Federal funds.

I thank you very much.

[The prepared statement of Hon. John LaFalce follows:]

STATEMENT OF
REP. JOHN J. LAFALCE OF NEW YORK
CHAIRMAN OF THE HOUSE SMALL BUSINESS GENERAL OVERSIGHT SUBCOMMITTEE
BEFORE THE HOUSE SCIENCE AND TECHNOLOGY COMMITTEE
JANUARY 27, 1982

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE, I APPRECIATE YOUR INVITATION TO APPEAR BEFORE THE SCIENCE AND TECHNOLOGY COMMITTEE ON BEHALF OF H.R. 4326, THE SMALL BUSINESS INNOVATION DEVELOPMENT ACT. I AM GLAD TO SEE THIS COMMITTEE GIVING THIS IMPORTANT BILL SUCH THOROUGH CONSIDERATION.

AS YOU MAY RECALL, THE WHITE HOUSE CONFERENCE ON SMALL BUSINESS STRONGLY ENDORSED THIS LEGISLATION IN JANUARY 1980, AND THE HOUSE SMALL BUSINESS COMMITTEE HAS BEEN WORKING OVER THE PAST TWO CONGRESSES TO ACHIEVE ITS ENACTMENT. OUR COMMITTEE SET THE STAGE FOR HOUSE CONSIDERATION OF THE INNOVATION BILL LAST OCTOBER BY UNANIMOUSLY REPORTING H.R. 4326. THE SENATE HAS ALREADY PASSED ITS VERSION OF THE INNOVATION BILL BY A 90 TO 0 VOTE.

THE SMALL BUSINESS INNOVATION DEVELOPMENT ACT IS LONG OVERDUE. WE HAVE ONLY TO LOOK AT THE SCIENTIFIC, TECHNOLOGICAL, AND ECONOMIC CHALLENGES OUR NATION FACES TODAY TO REALIZE WHY THIS LEGISLATION IS IMPERATIVE. THE WARNING SIGNS ARE CLEAR. WE SEE:

--A SHARP DROP IN U.S. PRODUCTIVITY. THE RATE OF PRODUCTIVITY FOR THE U.S. HAS DECLINED TEN-FOLD OVER THE PAST DECADE AND NOW LAGS FAR BEHIND THAT OF THE REST OF THE WORLD'S MAJOR INDUSTRIAL NATIONS.

--A SERIOUS DECLINE IN THE ABILITY OF THE U.S. TO INNOVATE AND TO APPLY INNOVATIONS FOR COMMERCIAL AND INDUSTRIAL PURPOSES. PATENT AWARDS TO U.S. NATIONALS HAVE BEEN DROPPING OVER THE PAST

DECADE, WHILE THE NUMBER OF INNOVATIVE TECHNOLOGY-BASED COMPANIES STARTING UP IS MUCH LESS THAN A FEW YEARS AGO, ACCORDING TO A U.S. COMMERCE DEPARTMENT STUDY. MOREOVER, IT IS JAPANESE COMPANIES, NOT U.S. COMPANIES, THAT HAVE BEEN APPLYING MANY AMERICAN TECHNOLOGICAL BREAKTHROUGHS, LIKE THE TRANSISTOR AND THE SEMI-CONDUCTOR. THE WALL STREET JOURNAL REPORTS THAT THE JAPANESE ARE GOING A STEP FURTHER AND ARE LAYING THE GROUNDWORK TO GENERATE THE TECHNOLOGICAL INNOVATION THAT THEY REALIZE IS ESSENTIAL FOR ECONOMIC GROWTH. WE IGNORE THE JAPANESE AT OUR OWN PERIL. AS WILLIAM AGEE, CHAIRMAN OF THE BENDIX CORPORATION, HAS WARNED, "...80 PERCENT OF THE ELECTRONICS PATENTS IN THE LAST FIVE YEARS HAVE BEEN ISSUED TO JAPANESE COMPANIES, SO THEY'RE GETTING READY (TO COMPETE) WITH PRODUCTS AS WELL AS PROCESSES. WE SHOULD BE VERY WORRIED."

--INADEQUATE RESEARCH INVESTMENT. AMERICAN INDUSTRY IS MORE INTERESTED IN SHORT-TERM PROFITS THAN IN LONG-TERM INVESTMENTS IN R&D. AS ROBERT H. HAYES AND WILLIAM J. ABERNATHY OF THE HARVARD BUSINESS SCHOOL HAVE POINTED OUT IN THEIR SEMINAL ARTICLE, "MANAGING OUR WAY TO ECONOMIC DECLINE," "...INVESTMENT IN BOTH NEW EQUIPMENT AND R&D, AS A PERCENTAGE OF GNP, WAS SIGNIFICANTLY HIGHER TWENTY YEARS AGO THAN TODAY...BY THEIR PREFERENCE FOR SERVICING EXISTING MARKETS RATHER THAN CREATING NEW ONES AND BY THEIR DEVOTION TO SHORT-TERM RETURNS AND MARKETING BY NUMBERS, MANY...(CORPORATE MANAGERS) HAVE EFFECTIVELY FORESWORN LONG-TERM TECHNOLOGICAL SUPERIORITY AS A COMPETITIVE WEAPON."

--STATEMENTS BY EXPERTS, INCLUDING A RECENT ARTICLE IN THE NEW YORK TIMES MAGAZINE SAYING, "THERE ARE MANY SCIENTIFIC, TECHNOLOGICAL, AND ECONOMICS EXPERTS WHO FEAR THAT THE U.S. STANDS ON THE BRINK OF ...A (TECHNOLOGICAL) DECLINE BECAUSE THE NATION'S

INGENUITY, ITS ABILITY TO CAPITALIZE UPON SCIENTIFIC FINDINGS AND CREATE A NEW TECHNOLOGY THAT LEADS TO NEW PRODUCTS IS FALTERING."

BURTON MALKIEL, CHAIRMAN OF PRINCETON UNIVERSITY'S ECONOMICS DEPARTMENT, AGREES. "THERE CAN BE LITTLE DOUBT THAT THE CREATIVE PULSE OF THE COUNTRY IS SLOWING DOWN," HE SAYS.

AN ALL-OUT EFFORT THAT UTILIZES ALL COMPONENTS OF OUR NATIONAL SCIENCE SYSTEM IS REQUIRED IF WE ARE TO KEEP THE U.S. INNOVATIVE AND OUR ECONOMY COMPETITIVE AND PRODUCTIVE. WE MUST DRAW ON NOT ONLY THE UNIVERSITIES, LARGE CORPORATIONS AND RESEARCH INSTITUTIONS, BUT ON THE SMALL SCIENCE AND HIGH-TECHNOLOGY FIRMS IN THIS EFFORT.

INDEED, THE SMALL SCIENCE AND HIGH-TECHNOLOGY FIRMS ARE THE KEY TO KEEPING THE U.S. THE PREEMINENT GENERATOR OF INNOVATION. A RECENT NATIONAL SCIENCE FOUNDATION STUDY REPORTED THAT ON THE BASIS OF A SAMPLE OF MAJOR INNOVATIONS INTRODUCED TO THE MARKET BETWEEN 1953 AND 1973, SMALL FIRMS WERE FOUND TO PRODUCE ABOUT 24 TIMES AS MANY MAJOR INNOVATIONS PER R&D DOLLAR AS LARGE FIRMS AND FOUR TIMES AS MANY AS MEDIUM-SIZED FIRMS.

MOREOVER, SMALL SCIENCE AND HIGH-TECHNOLOGY COMPANIES ARE ESSENTIAL TO REBUILDING THE U.S. ECONOMY. THESE FIRMS HAVE ONE OF THE FASTEST RATES OF GROWTH IN NET EMPLOYMENT, SALES, EXPORTS, PRODUCTIVITY, NET REVENUES AND TAX DOLLARS IN THE U.S. WE HAVE ALREADY SEEN THE TREMENDOUS BOOST THEY HAVE PROVIDED TO THE ECONOMIES OF SUCH STATES AS MASSACHUSETTS, NEW HAMPSHIRE, NORTH CAROLINA, AND CALIFORNIA.

SMALL BUSINESSES ARE THE PRIMARY CREATORS OF THE NEW JOBS THAT OUR ECONOMY AND OUR POPULATION SO DESPERATELY NEED. ACCORDING TO PROFESSOR DAVID L. BIRCH OF THE MASSACHUSETTS INSTITUTE OF

TECHNOLOGY, TWO-THIRDS OF THE NEW JOBS CREATED BETWEEN 1969 AND 1976 WERE CREATED BY FIRMS WITH 20 OR FEWER EMPLOYEES, AND ABOUT 80 PERCENT WERE CREATED BY FIRMS WITH 100 OR FEWER EMPLOYEES. FURTHERMORE, MANY OF THE SMALL BUSINESS JOBS ARE IN THE HIGH-TECHNOLOGY, HIGH "THOUGHT CONTENT" AREA. DRAWING FROM HISTORICAL EXPERIENCE, PROFESSOR BIRCH NOTES:

> JUST AS WE MOVED IN THE 1820'S AND THE 1830'S FROM BEING A BASICALLY AGRICULTURAL SOCIETY TO BEING AN INDUSTRIAL ONE, SO NOW ARE WE RAPIDLY ABANDONING OUR HEAVY INDUSTRIAL BASE IN FAVOR OF JOBS THAT DEMAND GREATER USE OF OUR MINDS AND LESS OF OUR MUSCLE AND DEXTERITY.
>
> THE TRANSFORMATION IS THUS A FUNDAMENTAL AND FAR-REACHING ONE. WE ARE MOVING FROM MANUFACTURING TO SERVICES, FROM HARDWARE TO "THOUGHTWARE," FROM LARGE-SCALE CAPITAL INTENSIVE COMPANIES TO SMALL-SCALE LABOR INTENSIVE COMPANIES, AND FROM DEPENDENCE ON PHYSICAL CAPITAL TO DEPENDENCE ON HUMAN CAPITAL.

THE SMALL BUSINESS INNOVATION DEVELOPMENT ACT IS A CRUCIAL PART OF THE EFFORT TO STIMULATE INNOVATION AND THE FIRMS THAT ARE THE GENERATORS OF INNOVATION. THE SMALL SCIENCE AND HIGH-TECHNOLOGY FIRMS PLAY A UNIQUE ROLE IN OUR SCIENTIFIC AND ECONOMIC SYSTEM BY SERVING AS A MEANS OF TRANSFERRING THE RESULTS OF RESEARCH OCCURRING AT THE FRONTIERS OF KNOWLEDGE TO THE MARKETPLACE. THIS IS VERY IMPORTANT TO THE UNIVERSITY SCIENTISTS AND ENGINEERS WHO DEVELOP THE INNOVATIVE IDEAS. MANY OF THE INDIVIDUALS WHO ESTABLISH THESE FIRMS ARE FORMER ACADEMICS OR UNIVERSITY RESEARCHERS WHO HAVE AN IDEA THAT THEY FEEL CAN BE COMMERICALLY MARKETED.

AS WE KNOW, SMALL BUSINESS AND UNIVERSITIES HISTORICALLY HAVE WORKED TOGETHER. ONE HAS ONLY TO LOOK AT THE CLOSE RELATIONSHIP BETWEEN THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND THE ROUTE 128 HIGH-TECHNOLOGY COMPLEX AROUND BOSTON. CLOSER TO HOME, WE HAVE ONLY TO LOOK AT THE NATIONAL SCIENCE FOUNDATION'S HIGHLY SUCCESSFUL SMALL BUSINESS INNOVATION RESEARCH PROGRAM, ON WHICH H.R. 4326 HAS BEEN MODELED. OVER HALF OF THE SMALL BUSINESS RECIPIENTS OF THE SMALL BUSINESS INNOVATION RESEARCH AWARDS UNDER THE NSF PROGRAM ARE INVOLVED WITH UNIVERSITIES, AND MOST OF THEM USE UNIVERSITY SCIENTISTS AND ENGINEERS AS CONSULTANTS. IN SOME CASES, THERE ARE JOINT UNIVERSITY/SMALL BUSINESS R&D EFFORTS. IN OTHER CASES, SMALL BUSINESSES USE UNIVERSITY FACILITIES AND SPECIAL INSTRUMENTATION. THIS COOPERATION MUST BE FOSTERED, ESPECIALLY IF WE ARE TO DEVELOP AND COMMERCIALLY MARKET THE NEW IDEAS, PRODUCTS, AND PROCESSES THAT WILL ALLOW US TO RETAIN OUR LEAD OVER FOREIGN COMPETITORS.

THE RESOURCES OF THE FEDERAL GOVERNMENT MUST BE INVOLVED IN THIS EFFORT. THE FEDERAL GOVERNMENT TODAY SPENDS $40 BILLION ANNUALLY ON R&D. MOST OF THAT R&D MONEY GOES TO UNIVERSITIES, LARGE COMPANIES, AND GOVERNMENT AND NON-PROFIT RESEARCH INSTITUTIONS. UNFORTUNATELY, SMALL BUSINESSES, INCLUDING SMALL SCIENCE AND HIGH-TECHNOLOGY FIRMS, RECEIVE A PITTANCE--LESS THAN 4 PERCENT OF TOTAL FEDERAL R&D FUNDS.

GIVEN SMALL BUSINESS'S IMPRESSIVE RATE OF INNOVATION AND BELOW-AVERAGE R&D COSTS, IT WOULD BE MUCH MORE EFFICIENT AND COST-EFFECTIVE FOR THE FEDERAL GOVERNMENT TO EARMARK A SMALL PERCENTAGE OF ITS EXISTING R&D BUDGET TO STIMULATE HIGH-QUALITY, WIDE-RANGING AND UNFETTERED INNOVATION BY SMALL SCIENCE AND HIGH-TECHNOLOGY COMPANIES.

H.R. 4326 WOULD DO JUST THAT. THE BILL WOULD HAVE GOVERNMENT AGENCIES WITH R&D BUDGETS EXCEEDING $100 MILLION A YEAR ESTABLISH

SMALL BUSINESS INNOVATION RESEARCH PROGRAMS. ALL TOO OFTEN, SMALL FIRMS FIND IT DIFFICULT TO ATTRACT THE PRIVATE CAPITAL NEEDED TO DEVELOP A NEW IDEA OR PRODUCT. A SMALL AMOUNT OF FEDERAL SUPPORT TO COVER EARLY DEVELOPMENT COSTS WOULD BE IMPORTANT IN GETTING PRIVATE FOLLOW-ON SUPPORT, ESSENTIAL FOR COMMERCIALIZATION. THE SMALL PERCENTAGE OF THE R&D BUDGET EARMARKED TO FUND THE SMALL BUSINESS INNOVATION RESEARCH PROGRAMS AND AWARDS IS NOT A DIVERSION OF R&D MONEY; IT IS AN INVESTMENT IN OUR FUTURE.

WE CAN NO LONGER AFFORD STATUS QUO POLICIES THAT IGNORE THE INNOVATIVE RECORD AND POTENTIAL OF SMALL SCIENCE AND HIGH-TECHNOLOGY COMPANIES AS OUR ECONOMY DECLINES AND AS THE JAPANESE PREPARE TO OVERTAKE US TECHNOLOGICALLY. THE SMALL BUSINESS INNOVATION DEVELOPMENT ACT ESTABLISHES A FORWARD-LOOKING, CREATIVE PROGRAM TO STIMULATE INNOVATION. IT ALSO RECOGNIZES THE LIMITS ON THE GOVERNMENT'S RESOURCES BY PROVIDING FOR THE WISE AND EFFICIENT USE OF FEDERAL FUNDS.

Mr. **FUQUA**. We will now hear from our colleague, Congressman Bedell from Iowa.

Mr. **BEDELL**. I have some prepared statements here that truly are a masterpiece, but because of the shortage of time I would ask they be entered into the record.

Mr. **FUQUA**. Without objection they will be included in the record.

Mr. **BEDELL**. I would like to tell you of a few of my beliefs and where I come out on this legislation. I start out with my belief that the oldest proponents of supply side economics have missed half of the problem. As I understand it, their argument seems to be: put more money into capital resources in order to automate plants so they will build more products, and economy will boom.

I submit to you, however, that building more of the products we already have is not going to solve our economic problems. For example, if we go ahead and build more commercial airplanes when the airlines already have a lot of planes in storage, will not help us sell airplanes. A family which has a television in the living room, den, and bedroom are not going to be running out to buy a lot more television sets.

My belief is the only way we are going to get this country moving forward is to move into a new age of technology where we bring forth things that are better than what we presently have. If we were, for example, to build an airplane that used a third or a fourth of the fuel our airplanes now use, the industry and our economy would benefit.

I believe that, particularly because of our space technology, we are just on the verge of new technology that is going to make obsolete a lot of the products we presently have. Rather than saying we are going to spend more and more money automating plants to build obsolete goods, I think we need to go forward into new technologies which can not only get our industry moving but move us into a whole new and better world.

If I am correct and if that is what we should do—then certainly the way to do it is to exploit the most efficient, practical, economic sector of our economy, small businesses. As Mr. LaFalce has already indicated, studies have shown that small business firms, per dollar spent, are 24 times as productive as a big business.

It seems to me that if we are going to move forward into new technologies then we certainly should take advantage of this most efficient economic sector, and further, small innovative businesses have serious capital problems and it is very important to our economy that we preserve and foster growth in this vital segment of our economy. Not just for the sake of the business interests but for our Nation's sake. Because if we lose this innovative asset in our economy, I think we will be in serious trouble.

The Small Business Committee passed this with a unanimous vote. It would certainly be my hope this committee would similarly support this legislation which I believe makes such ultimate good sense.

[The prepared statement of Mr. Bedell follows:]

BERKLEY BEDELL, IOWA
CHAIRMAN

NICHOLAS MAVROULES, MASS.
CHARLES HATCHER, GA.
DENNIS E. ECKART, OHIO

United States House of Representatives
Committee on Small Business
Subcommittee on Energy, Environment, and
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STATEMENT OF

HON. BERKLEY BEDELL

Before the

House Science and Technology Committee

January 27, 1982

Dear Mr. Chairman:

I commend you and your committee for your timely action on the Small Business Innovation Research Act. As you know, this legislation is anxiously awaited by the small business community.

I welcome this opportunity to comment on the pending legislation and ask that this statement be made a part of your hearing record.

Various witnesses who will appear before your Committee will discuss in some detail the mechanics of this legislation. Rather than repeating that same information, I would like to point out what I feel is the need for this legislation and just how I expect the legislation will work to stimulate and benefit our national economy.

First, let me refer to the material attached to this statement. These include a press release announcing the National Science Foundation's Small Business Innovation Research Awards for 1977-81, a background paper describing the NSF Small Business Innovation Research Program, and a list of the small businesses receiving NSF SBIR funding.

I strongly urge you to review the list and note the tremendous diversity of award categories. The 85 awards in 1981 were made for advanced research in the following areas of potential application: materials; bio-sources of materials; advanced manufacturing processes; advanced chemical processes; industrial biological processes; microelectronics; communications and systems; computer science and engineering; robotics and controls; scientific and industrial measurements; radiation processing and control; light machinery and components; advanced automotive research; food process engineering; marine resources; mineral resources; environmental technology; tunneling; earthquake engineering; and science and technology to aid the handicapped.

The NSF program is a highly competitive one. Of the more than 2000 proposals NSF has received since 1977, only 284 were selected for Phase I awards. Furthermore, of the funded Phase I proposals, 25% have historically received Phase II funding. Thus, only about 3.5% of all proposals will be funded through the NSF SBIR program.

I raise this point because I am dismayed by insinuations I have heard that SBIR programs would in some way diminish the quality of research and development in the United States. There can be no doubt that there is a large and diverse enough body of small, high-technology firms in America to provide the vigorous competition that will insure nothing but the highest quality research and development from agency SBIR programs.

To be blunt about it, Mr. Chairman, I am somewhat concerned about the quality of competition in the present system of R&D contract awards. It sometimes seems that in certain agencies, research proposals are weighed as much for the influence of the applicants as they are for the quality of the ideas.

The unanimous vote in support of the legislation by the Small Business Committee is a reflection of our observation that small firms are suffering because they have the least political clout and have the meekest voice in this town. They cannot afford to spend their resources on Washington lawyers and expensive lobbyists, and thus they are being pushed to the end of the line, despite the merits of their work.

Lacking any other explanation as to why small business' share of federal research and development procurement is languishing at 3 1/2% of our national effort, I am forced to consider the anti-risk and anti-small business attitudes that pervade much of the beauracracy. Trying to minimize the risks that are inherent in research and development activity, federal agencies have shown an amazing bias toward giving contracts to our largest institutions as opposed to relatively unfamiliar small firms.

I am concerned about the anti-small business attitudes of academically oriented agencies. A 1980 study done for the SBA by the Research and Planning Institute, Inc. of Cambridge, Mass. states:

> One problem that came up several times was the inability of small business to receive basic research support from certain agencies, especially NSF and NIH which primarily fund research at university and non-profit institutions. In fact, their ideas are not even given a fair hearing. One company, that wished to gain support for basic research to better understand the scientific underpinnings of its technology, created a non-profit laboratory facility. The non-profit institution was able to obtain basic research funds to pursue to originally proposed research. While most people were in favor of government support of basic research, there was resentment that in those cases where a profit making business could do the work better than another institution at no additional cost it still was denied the opportunity to do so.

I think it is ironic that in one of these agencies, NSF, small business has had a very difficult time breaking into their regular R&D procurement process. Yet NSF, at the same time, is operating a highly productive and effective SBIR program. This clearly illustrates the institutional problem small businesses face when attempting to gain access to federal R&D contracts.

Opponents of this legislation have claimed that small business research proposals do not fit established molds, i.e., basic research, applied research, etc. On this point, the legislation's opponents are correct. Perhaps this is exactly why they have such trouble understanding what the legislation is designed to do. It is intended to break the established molds. It is designed to get new people involved in federally-funded research and it is intended to help us get more bang for the federal R&D dollar.

The government's willingness to fund unsolicited innovation proposals is of paramount importance to the health of our economy. Just as basic research is vitally important for increasing our awareness of our changing world, innovative research is important to the development of new products and processes to meet national problems and improve the quality of life for everyone. This legislation in no way attempts to favor one "type" of spending over another, it is merely a method of assuring that the small business sector will get some small share of federal research and development dollars to demonstrate its proven ability to produce innovative technological developments.

Of course, we are aware of the significant cutbacks in federal research and development spending that have been proposed and implemented recently. Universities and small businesses alike will be directly affected. Small businesses with innovative ideas have been helped a great deal by government support of their unsolicited proposals. Unfortunately, the current changes in federal R&D policy have affected the government's level of support for unsolicited proposals, in fact it has almost disappeared.

As the report by the Research and Planning Institute says:

> If proposed research does not fit into a well defined segment of the current research strategy of a government agency, no mechanism exists to permit its funding, regardless of its merit. Companies can survive by providing incremental information and developing the appropriate instrumentation to move along an existing, government supported technology. But the radically new ways of solving problems are not given a reasonable chance to prove their validity. The current climate, with its tight R&D budgets that must be defended as mission related and the propensity, when in doubt, to give money out in large segments to well known companies, all work against the development of new, exciting technical advances.

The intent of the SBIR legislation is to provide a place in each federal agency for innovative small firms to submit research proposals. The legislation, as reported by the Small Business Committee, gives each federal agency the flexibility to set up its SBIR program in any manner it feels best serves areas of national need as designated by the agency. I would hope that proposals and ideas will flow into SBIR programs from within an agency as well as from the outside. I expect that there will be a great deal of coordination between agency program directors and SBIR officials and that vigorous technical monitoring of SBIR contracts will come from appropriate agency program offices.

Past and present experience clearly shows that the small business and university communities are intertwined in the performance of research and development activities. For example, of the 21 small business award winners in NSF's 1977 Phase II SBIR solicitations, 19 of the small businesses were coupled with a total of 36 university research programs.

In another example, a new research facility being opened at a leading West Coast university is receiving major funding assistance from several Fortune 500 high technology corporations. These companies once were small, high technology firms themselves with roots in the university community.

Small businesses often assist universities in taking research out of the laboratory and into the marketplace. On the other hand, universities offer small businesses a resource pool for many research functions. Clearly, agency SBIR programs will entail a high degree of university participation, tapping the best skills of both institutions in a highly productive fashion.

Stimulating innovative activity among small firms offers us a way to help improve our rapidly eroding position of technological superiority in the world. It will afford us the chance to build a strong economic base that will help us to achieve energy independence, to increase productivity, to solve biological, genetic and medical questions and to maintain our national security.

Small, innovative firms exhibit remarkable job creation rates. The benefits they provide both locally and nationally should be of great interest to everyone in a time when our economy is feeling the effects of the decline in the rates of growth and productivity in our mature industries.

If the United States desires to control inflation, stimulate economic growth, provide jobs, nurture new industry and improve the quality of life for its people, then individual entrepreneurs and small firms must be encouraged to engage in innovation. Unfortunately, however, the most innovative sector of the American economy, small science and technology based enterprises, have been virtually excluded from federally-funded research activity.

These are the reasons this very modest piece of legislation is needed. I urge you to protect the integrity of the concepts and funding mechanisms contained in the Small Business Innovative Research Act.

NATIONAL SCIENCE FOUNDATION news

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NSF PR81-69

NSF MAKES SMALL BUSINESS INNOVATION RESEARCH AWARDS

The National Science Foundation (NSF) announced 85 awards totaling $2.4 million to small science- and technology-based firms. The awards which were made through the Foundation's Small Business Innovation Research (SBIR) program recognize the role such firms play in research and its conversion into technological innovation in the economy. The program is designed to increase the public return on investment from Federally funded research.

The primary aim of the SBIR program is the support of advanced research on important scientific and engineering problems and opportunities that could lead to significant public benefit if the research is successful. A second important goal is the conversion of NSF supported research into industrial applications and technological innovation where appropriate. To accomplish this, the program's design encourages the small firm to pursue potential commercial applications of the Government research with follow-on private venture capital. Federal funds only support research consistant with NSF program objectives.

A total of 696 proposals were received under the 1981 SBIR program from 43 states and the District of Columbia. Firms receiving awards ranged from a start-up one-man firm to a company with 425 employees.

The 85 awards were made for advanced research in the following areas of potential application: materials; bio-sources of materials; advanced manufacturing processes; advanced chemical processes; industrial biological processes; microelectronics; communications and systems; computer science and engineering; robotics and controls; scientific and industrial measurements; radiation processing and control; light machinery and components; advanced automotive research; food process engineering; marine resources; mineral resources; environmental technology; tunneling; earthquake engineering; and science and technology ot aid the handicapped.

The awards are for phase I of the three-phased SBIR program. These awards are for up to $30,000 and six months to determine, as much as possible within these limitations, whether the research idea appears technically feasible and whether the small firm can do high-quality research before further government support takes place.

Phase II is the principal research effort for those projects appearing the most promising after the first phase. These awards have averaged $200,000 for 1-2 years. Phase III involves the follow-on private funding from venture capital or large industrial firms to pursue potential commercial applications of the government-funded research. No government funds are provided in phase III. As a result of the first SBIR solicitation, however, more than $23 million from private sources has been obtained by the small companies to date to continue the NSF research into industrially relevant applications. Firms that have completed phase II also have more than doubled their employment on the average since they submitted their phase I proposal.

In the first SBIR solicitation in 1977-78, NSF funded OMEX, a small California firm, in laser optics research for $173,000. This led to the company's obtaining $5 million from a venture capital firm to pursue large scale computer storage applications of the NSF research. More recently the firm obtained an additional $4 million from a major title insurance company to produce full-scale hardware. If successful, the research may have made a significant contribution to the promising new field of large-capacity electronic filing and information storage.

Similarly, Terra Tek, Inc., a small Utah firm was funded for research on measuring metal fracture toughness. The company went on to develop an instrument to measure the fracture toughness of mining and petroleum drill bit components. This instrument is now being manufactured in the U.S. by Terra Tek and has sales world-wide. Terra Tek is now developing a full-line of measure metal fracture toughness instruments for use in many other important fields where such measurements previously were not economically feasible.

Collaborative Research, Inc., a small Massachusetts firm, was funded in 1977 for genetic research to enhance animal protein production. This research resulted in the company obtaining $5 million of follow-on investment from a major U.S. chemical firm.

The SBIR program also stimulates technology transfer of government research to the private sector as an integral part of the research process, rather than after R&D has been completed or a product produced for government use.

A complete list of companies receiving awards is attached.

NSF SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Background: The NSF Small Business Innovation Research or SBIR program was initiated in 1977 to stimulate quality proposals in NSF program areas to meet the Congressional requirement at that time that 10 percent of the NSF applied research budget be spent on research conducted by small business firms. This was equivalent to about one percent of the NSF budget. To reach high caliber small firms and to achieve other objectives, NSF designed a special three-phased program with incentives of particular interest to small science-based and high-technology firms.

Program Objectives:

- To increase the opportunity for small science and high technology firms to participate in NSF research.
- To support quality research of interest to NSF with emphasis on areas that have potential application in industry.
- To couple NSF research to follow-on private venture capital or other support to pursue commercial applications from the NSF funded research project.
- To increase technological innovation from government funded research.
- To improve the economic and social return on investment from Federal research.

Program Description: Phase I supports research proposals of up to $30,000 for six months on important scientific or engineering problems or opportunities of interest to NSF. Those projects found most promising after phase I receive phase II awards which have averaged $200,000 for 1 - 2 years. This is the principal research project. Phase III is to pursue commercial applications where possible from the NSF research supported in phases I and II and is funded entirely with private capital.

Design: The program invites proposals from small firms with strong research capabilities in 15-25 specific advanced research areas of interest to NSF. A standard format is used to simplify the process. Phase I proposals are also limited to 20 pages to reduce the investment in preparation to the proposer and the time required for review. NSF specialists in each topic serve as topic managers. Peer reviews are obtained on the proposals, usually from university or government scientists or engineers, and occasionally the private sector.

The program is unique in that it provides an incentive for the grantee to pursue commercial applications from the SBIR research. Proposers are encouraged to obtain a commitment for follow-on funding from the private sector for phase III which is the product or process development phase. Government funds are spent solely on research of interest to NSF in phases I and II; private funds pursue commercial objectives in phase III. The commitments are treated as an extra point-of-merit in the evaluation process where proposals are otherwise considered of approximately equal technical merit.

The commitments are obtained from a third party, normally a venture capital or larger industrial firm, for an amount at least equal to the funding requested from NSF for phase II research. The use of the third party is to increase objectivity and to use private firms to evaluate the potential market, management and future financial requirements for the commercial application. Government is not involved in these evaluations but solely in considering any follow-on funding commitment presented. The approach provides an incentive for the conversion of the NSF research into industrial applications and technological innovation at little or no additional cost to government.

Current Status: Four solicitations have been conducted to date - in 1977, 1979, 1980 and 1981. The 1977 solicitation has completed phase II, 1979 is in phase II, 1980 made some phase II awards with more planned this year and 1981 is in phase I. A fifth solicitation is planned for January 1982. The program design anticipates that approximately one-half of those projects found most promising in phase I will be funded in phase II.

Results to Date: The program is highly competitive with over 2000 proposals received and only 284 awards made to date. Proposals have been received from firms in 49 of the 50 states plus the District of Columbia and awards have been made to firms in 36 states and the District as follows:

	Solicitation				
	1977	1979	1980	1981	Est. 1982
Phase I Proposals	329	408	530	696	700
Phase I Awards	42	54	62	85	50 - 80
Phase II Awards	21	13	20 - 30 (planned)	30 - 40 (planned)	25 - 40

Phase II awards since 1977 have been reduced due to limited available funding.

In addition to the SBIR program supporting advanced research in a wide range of program areas, the 21 phase II grantees in the 1977 solicitation have received $23 million in follow-on funding to date. These 21 firms also have more than doubled their employment. NSF funding in phases I and II of the 1977 solicitation totaled $5.3 million. There have been new firms started as a result of the program and some 15 inventions reported. A number of new products and processes are under development and one has reached the market place. An increasing number of the industrial and venture capital firms are showing interest in the program as the SBIR topics have become more industrially relevant.

Coordination: NSF coordinates and cooperates with most Federal agencies with significant R&D budgets. Other agency and university scientists and engineers often review SBIR proposals as do some private sector people. The NSF staff has assisted DOD with its similar Small Business Advanced Technology program and discussed the program with other agencies. The DOD program anticipates 150 phase I awards of up to $50,000 and up to $500,000 in phase II with the opportunity for follow-on production contracts in DOD as well as private sector commercialization in phase III.

Proposers are encouraged to cooperate with university resources such as through consulting arrangements, sub-contracts and the use of special facilities on occasion. Most grantees have done so, particularly in utilizing university scientists and engineers as consultants.

NSF SMALL BUSINESS INNOVATION RESEARCH PROGRAM

SIGNIFICANT RESULTS

- 284 awards funded to date on NSF research.

- Laser optics research was funded with OMEX, a small electronics firm in Santa Clara, Cal. for $25,000 for phase I in 1977 and $147,000 for phase II in 1978. The firm then received $5 million in phase III from the Heizer Corporation, a Chicago SBIC, for application of the research to a new field of electronic filing based upon the potential storage density. OMEX has since signed a $4 million contract to produce the equipment for the nation's largest title insurance company in Los Angeles.

- Genetics research was supported in 1977 with Collaborative Research of Waltham, Mass., to enhance animal protein production. This was well before the Supreme Court decision and subsequent availability of venture capital. It was the company's first genetics research. NSF funding was $25,000 for phase I and $235,000 in phase II. Dow Chemical provided $7 million of follow-on contract funding to pursue technology of interest to Dow and more recently invested an additional $5 million for a 5 percent equity in the company.

- To increase productivity, NSF funded Advanced Mechanical Technology of Newton, Mass. for advanced research to implant an isotope on the cutting edge of machine tools for automatic production processes for $25,000 in phase I and $186,000 in phase II. GE, Ford, Chrysler and Raytheon were all interested as were the Japanese. Although no radiation problems are anticipated, the problem of obtaining the approval of the NRC, OSHA and EPA will take two years. Currently a fifth major U.S. industrial firm with plans for a new partially automated factory is interested.

- Research on measuring metal fracture toughness was funded with Terra Tek of Salt Lake City for $25,000 in phase I and $220,000 in phase II. The company has now built an instrument to measure the fracture toughness of drilling bits for mining and petroleum needs which is being sold world-wide. They are now developing a full line of instruments to meet a wide range of applications in many different kinds of metals.

- Soil and Land Use Technology, Inc. of Columbia, MD, received awards to determine the feasibility of introducing foreign food crops into the U.S. which were better adapted to environmental stress such as arid, wet or saline conditions. Their study has become widely known and they have recently received $130,000 from the American Newspaper Publishers Association to pursue kenaf, a hemp-like crop which grows in wet areas, as a possible source of newsprint.

- Three earthquake engineering firms in the Los Angeles area that received grants in phase I formed ABK, a joint-venture, to conduct phase II using the unique capabilities of each firm. The study is probably the most comprehensive and best known to date in the important area of strengthening existing non-reinforced masonry buildings. The results are being implemented in Los Angeles building codes, studied by other cities and states. Professional organizations are using the study to develop revisions to model building codes which will have world-wide application.

NATIONAL SCIENCE FOUNDATION

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

PHASE I AWARDS - SEPTEMBER 1981

Firm	Location	Project Title
Topic 1 - MATERIALS RESEARCH		
1. Spire Corporation	Bedford, MA	Ion Beam Deposition of Cubic Boron Nitride As a Hard Coating from Borazine
2. Center for Innovation, Inc.	Butte, MT	Centrifugal Plasma Furnace
3. Fiber Materials, Inc.	Biddeford, ME	Investigation of Fiber-Reinforced Microcracked Ceramics
4. Solarex Corporation	Rockville, MD	Chemical Vapor Deposition of Amorphous Silicon
5. Ceramic Finishing Co.	State College, PA	Grain Boundary Phases for Structural Ceramics
Topic 2 - BIO-SOURCES OF MATERIALS		
6. SISA Inc.	Cambridge, MA	Antifungal Constituents of Rhamnus Prinoides
7. Ecoenergetics, Inc.	Fairfield, CA	Chemicals From Halophilic Microbes
8. Covalent Associates	Framingham, MA	Electrocatalytic Reduction of Lignin to Phenolic Feedstocks
9. Plant Resources Institute	Salt Lake City, UT	In Vitro Production of Saltbush for Revegetation and Range Improvement
10. BioChem Technology Inc.	Malvern, PA	Production of Cellulose Powders Using Cellulase Enzymes
Topic 3 - GENETIC TECHNOLOGY		
No Awards		

Topic 4 - ADVANCED MANUFACTURING PROCESSES

11. Magnasonics, Inc.	Albuquerque, NM	Electromagnetic Transducers for Weld Inspection
12. Hahn Associates	Northboro, MA	Computer Control for Small-Hole Grinding
13. Pritsker & Associates	West Lafayette, IN	Development and Identification of Operations Research Algorithms for Small Computers
14. Flow Technology Co.	Kent, WA	Abrasive-Waterjet Metals Cutting
15. U.S. Automation Co.	Warren, MI	Thermastress Concept for Steel Reinforcing Wire Manufacture

Topic 5 - ADVANCED CHEMICAL PROCESSES

16. Merix Corporation	Babson Park, MA	A New Class of Separating Agents
17. Andrulis Research Corp.	Bethesda, MD	Hybrid-Phase Catalysts for the Oxidation of Phenol to Benzoquinone
18. Castle Technology Corp.	Woburn, MA	Electrochemical Production of Ozone
19. Electrochimica Corp.	Mountain View, CA	Non-Noble Metal Electrocatalysts

Topic 6 - INDUSTRIAL BIOLOGICAL PROCESSES

20. Collaborative Research, Inc.	Waltham, MA	Optimization and Automation of Gene Synthesis
21. Bio-Metric Systems, Inc.	Navarre, MN	Competitive Inhibitor-Enzyme Immunoassay
22. SISA Inc.	Cambridge, MA	Antibiotics from Isopods
23. Bonneville Scientific	Salt Lake City, UT	Acoustic Protein Separation

Topic 7 - MICROELECTRONICS

24. Mathematical Sciences Northwest, Inc.	Bellevue, WA	Soft X-Ray Source for Microlithography
25. Advanced Research and Applications Corp.	Sunnyvale, CA	High-Throughput Line-Source Electron Beam Processing of Silicon-on-Insulator Structures for Microelectronics
26. Scientific Research Associates, Inc.	Glastonbury, CT	Transient Three Dimensional Numerical Simulation of Microelectronic Semiconductor Devices

Topic 8 - COMMUNICATIONS AND SYSTEMS

27. Cyclotomics, Inc.	Berkeley, CA	Coding for Band-Limited Channels
28. Spire Corporation	Bedford, MA	Electrostatically Bonded Fiber-Optic Coupler
29. ALPHATECH, Inc.	Burlington, MA	On-Line Tool Wear Estimation and Failure Prediction in Metal-Cutting Operations
30. Scientific Systems Inc.	Cambridge, MA	Advanced Control of Electric Arc Furnaces
31. Systems Engineering for Power, Inc.	Vienna, VA	Variable Structure Servomechanisms

Topic 9 - COMPUTER SCIENCE AND ENGINEERING

32. Computational Mechanics Consultants, Inc.	Knoxville, TN	Array Processing of the Three-Dimensional Navier-Stokes Equations
33. Relational Technology, Inc.	Berkeley, CA	Distributed Database Management on Local Networks
34. Tractell, Inc.	Dayton, OH	Optical Image Analysis of VLSI Microcircuits
35. King Research, Inc.	Rockville, MD	Structure, Accessing, and Manipulation of Numeric Data Bases

Topic 10 - ROBOTICS AND CONTROLS

36. Kazuko Enterprises, Inc.	Orlando, FL	Distance Sensor for Robotics
37. Microbot, Inc.	Menlo Park, CA	Servo for Industrial Robot with Force Control
38. Deft Laboratories Inc.	East Syracuse, NY	Robot Vision Techniques Using Acousto-Optic Image Sensors
39. Optra, Inc.	Everett, MA	Robotic Camera Improvements
40. Automatix Inc.	Burlington, MA	Advanced Programmable Grey-Scale Vision for Robotics

Topic 11 - SCIENTIFIC AND INDUSTRIAL MEASUREMENTS

41. Charles Evans & Assoc.	San Mateo, CA	Advanced Detection System for Quantitative Three-Dimensional Ion Microscopy
42. Lake Shore Cryotronics, Inc.	Westerville, OH	Quantum Ferroelectric Pressure Sensor
43. ALM, Inc.	Arlington, VA	Latent Fingerprint Fluorescence By Means of an Acousto-Optic Output Coupled (Cavity-Dumped) Variable Pulse Width Argon-Ion Laser
44. KOR, Inc.	Cambridge, MA	Laser-Based Photoacoustic Method for Measuring Stable Isotope Ratios
45. Aerodyne Research, Inc.	Bedford, MA	Scanning Spectral Correlator
46. Advanced Research and Applications Corp.	Sunnyvale, CA	Compton Backscatter Computed Tomography
47. Spectron Development Laboratories, Inc.	Costa Mesa, CA	Eddy Current Imaging
48. Quantatech International Inc.	Chatsworth, CA	Photon Induced Surface Conductivity Requiring the Presence of Sorbed Photoionizable Species

Topic 12 - RADIATION PROCESSING AND CONTROL

49. Advanced Fuel Research, Inc.	East Hartford, CT	Microanalysis Methods for Inhomogeneous Materials
50. Scientific Measurement Systems, Inc.	Austin, TX	Spatial Resolution in Industrial Tomography
51. Mission Research Corp.	Albuquerque, NM	High Currrent Ion Implantation

Topic 13 - LIGHT MACHINERY AND COMPONENTS

52. Eagle Engineering Inc.	Pittsfield, MA	Direct Action of Electromagnetic Fields on Fluids
53. Solamat Inc.	East Providence, RI	Bearing Structures Fabricated from Arc Plasma Sprayed Layers Coated with Solid Film Lubricants
54. Shaker Research Corp.	Ballston Lake, NY	Self Feeding Fluid-Film Bearing
55. IMEC Corporation	Boston, MA	Improved Dynamic Torque Control of Standard Induction Motors

Topic 14 - ADVANCED AUTOMOTIVE RESEARCH

56. Cambridge Collaborative, Inc.	Cambridge, MA	Application of Resilient Bearings to a Crankshaft of a Diesel Engine
57. KOR, Inc.	Cambridge, MA	Deuterated Additives for Automotive Lubricants
58. Materials Sciences Corporation	Blue Bell, PA	Woven Fabric Reinforced Composites for Automotive Applications

Topic 15 - FOOD PROCESS ENGINEERING

59. Webb Foodlab, Inc.	Raleigh, NC	Effect of Processing Techniques on the Reduction of Cholesterol and Lipids in Muscle Foods

Topic 16 - MARINE RESOURCES

60. Aquatic Farms	Kaneohe, HA	Cage Culture of Red Tilapia in Prawn and Shrimp Ponds
61. Abandoned Farm, Inc.	Damariscotta, ME	Stabilizing Canadian Mussel Seed Transplanted into New England Waters
62. Dynalysis of Princeton, Inc.	Princeton, NJ	Modeling the Coastal Ocean - A Step Towards Marine Forecasting Capability
63. Research Planning Institute, Inc.	Columbia, SC	Improved Pond Aquaculture in the American Oyster, Crassostrea Virginica (Gmelin)

Topic 17 - MINERAL RESOURCES

No Awards

Topic 18 - ENVIRONMENTAL TECHNOLOGY

64. JTC Environmental Consultants Inc.	Bethesda, MD	Inhibition of Microbial Growth on Activated Carbon Beds
65. Huey Corporation	Morgantown, WV	Clean Combustion of Oil Shale in Fluidized Beds
66. QED Corporation	Ann Arbor, MI	Inductive Heating of Spent Granular Activated Carbon
67. Flow Technology Co.	Kent, WA	Engineering Development of a Clean Burning Residential Wood Stove

Topic 19 - TUNNELING, DRILLING, EXCAVATION, AND DREDGING

68. Hydronautics, Inc.	Laurel, MD	Self-Resonating High Pressure Water Jets for Tunneling, Excavation & Mining
69. Flow Technology Co.	Kent, WA	Novel Rock Tunneling and Excavation Method

Topic 20 - EARTHQUAKE ENGINEERING

70. Scientific Service, Inc.	Redwood City, CA	Comprehensive Computer-Aided Earthquake Analysis and Program Development for Business and Industry
71. Scientific Measurement Systems, Inc.	Austin, TX	Tomographic Assessment Techniques for Earthquake Engineering
72. Advanced Technology & Research, Inc.	Silver Spring, MD	In-Situ Determination of Damping of Soils
73. Geotechnical Engineers, Inc.	Winchester, MA	Field Index Test for Estimating Liquefaction Potential
74. ANCO Engineers, Inc.	Santa Monica, CA	Seismic Hazard Assessment of Nonstructural Ceiling Components
75. Michael E. Durkin & Associates	Woodland Hills, CA	Alternative Methods for Hazard Reduction in Unreinforced Masonry Buildings

Topic 21 - SCIENCE AND TECHNOLOGY TO AID THE HANDICAPPED

76. Fiber Materials, Inc.	Biddeford, ME	Fatigue Mechanisms in a 3D Carbon-Carbon Composite
77. Advanced Mechanical Technology, Inc.	Newton, MA	Impedance Test for Intramedullary Anchored Femoral Prosthesis Loosening
78. EMV Associates, Inc.	Rockville, MD	Biotechnical Multi-Electrode/Neuronal Interface
79. Time/Space Systems	Endicott, NY	Signal Processing Concept Applicable to Hearing
80. Technology Transfer Concepts International	Neenah, WI	Natural Gum Substitute for Karaya Gum for Ostomy Products

Topic 22 - APPROPRIATE TECHNOLOGY

81. Thomas C. Wilder, ScD	Waltham, MA	Characterization of Three-Metal Galvanic Cells in Seawater
82. Dow Associates, Inc.	Berkeley, CA	Ecological Principles of Stability as a Means of Understanding the Role of Appropriate Technology in Agriculture
83. Snell Environmental Group Inc.	Lansing, MI	Rate of Biodegradation of Toxic Organic Compounds
84. Hydronautics, Inc.	Laurel, MD	Reducing/Separating Recoverable Demolition Wastes with Cavitating Water Jets
85. Cal Recovery Systems, Inc.	Richmond, CA	Integrated Energy-Agro-Waste Systems for Small-Scale Farms

NATIONAL SCIENCE FOUNDATION

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

PHASE I AWARDS - AUGUST 1980

	FIRM	LOCATION	PROJECT TITLE
Topic 1 - Advanced Measurement Research			
1.	EMV Associates, Inc.	Rockville, MD	Electron Beam Lithography of Protein Monolayer Ultrathin Composite Resist Films
2.	Intermagnetics General Corp.	Guilderland, NY	NMR Imaging Microscope
3.	KLD Associates, Inc.	Huntington Station, NY	Acoustic Concept for Measuring Particle Size Distributions
4.	Lansing Research Corporation	Ithaca, NY	Acoustooptic Filter Side Lobe Supression
5.	LuTech, Inc.	Berkeley, CA	Superconducting Magnetometer with Quantum Noise Limited Sensitivity and Enhanced Coupling Properties
6.	ORINCON Corp.	La Jolla, CA	Detection and Identification of Fish Schools From Sonar Echoes
7.	Spectron Development Laboratories, Inc.	Costa Mesa, CA	Near Surface Flaw Detection by Ultrasonic Critical Angle Imaging
Topic 2 - Advanced Production Research for Discrete Parts Manufacturing			
8.	Dyna East Corp.	Wynnewood, PA	Numerical-Controlled Orbital Forging Processes
9.	The Merrick Corp.	Nashville, TN	Adaptive Arc Tracking For Welding
10.	Taylor Systems Engineering, Inc.	Fair Oaks, CA	Adaptive Welding System

FIRM	LOCATION	PROJECT TITLE
Topic 3 - Industrial Processes		
11. Ceramic Finishing Co.	State College, PA	Toughened Ceramic Adhesives for Structural Ceramics
12. Castle Technology Corporation	Lexington, MA	Electrorefining of Aluminum
13. Ceramatec, Inc.	Salt Lake City, UT	Electrorefining of Sodium Using Solid State Rapid Ion Conductors
14. Hazen Research, Inc.	Tucson, AZ	By-Product Molybdenum Recovery
15. Ribbon Technology Corporation	Canal Winchester, OH	Thin Steel Sheet Made From Melt Extracted Flake
16. T. S. Associates, Inc.	Columbia, MD	Suspended Solids Removal Using Cross-Flow, In-Depth Filtration
Topic 4 - Deep Mineral Resources		
17. General Ionex Corporation	Newburyport, MA	A Multi-Channel Ultra-Sensitive Analyzer for Mineral Resources
18. Zycor, Inc.	Austin, TX	Interpolation of N-dimensional Geophysical Data
Topic 5 - Alternative Biological Sources of Materials		
19. Ecoenergetics, Inc.	Vacaville, CA	Microalgae Production of Glycerol and Related Chemicals on Saline Waters
20. Native Plants, Inc.	Salt Lake City, UT	Investigation of New Source of Natural Rubber in the United States
21. Simco, Inc.	Weston, CT	The Chinese Tallow Tree as a Source of Petroleum Substitutes

FIRM	LOCATION	PROJECT TITLE
Topic 6 - Microbial Fertilizers, Activators, and Conditioners		
22. Native Plants, Inc.	Salt Lake City, UT	A Mycorrhizal Inoculated Containerized Plant Growing System
Topic 7 - Human Nutrition		
23. Northern Instruments Corp.	Lino Lakes, MN	The Measurement of Dielectric Constant as a Method for Quality Assessment of Frying Oils
Topic 8 - Advanced Marine Farming		
24. Ocean Pond Corporation	Fishers Island, NY	Enrichment of a Brackish Water Pond for Shellfish
25. Pacific Ocean Farms, Ltd.	Carmel Valley, CA	Off-shore Abalone Farm Research Project
26. Terry M. and Sari K. Astro	Eleele, Kauai, HI	Commercial Potential of Sex Reversal on Hybrid Tilapia
Topic 9 - Groundwater Pollution		
27. Bend Research, Inc.	Bend, OR	Waste Pond Treatment with Immobilized Liquid Ion Exchangers
28. Energy and Environmental Engineering, Inc.	Cambridge, MA	In-Situ Gelation to Control Emissions from Abandoned Hazardous Waste Sites
29. Energy Resources Co., Inc.	La Jolla, CA	Halocarbon Emulsions as Safe & Effective Hydrological Tracers
Topic 10 - Earthquake Engineering, Architecture and Urban Planning		
30. ABRI Inc.	Cambridge, MA	Morphology of Tensile and Pneumatic Structural Systems for Seismic Design

FIRM	LOCATION	PROJECT TITLE
31. Advanced Technology & Research, Inc.	Silver Spring, MD	Application of the Randomdec Technique to Improve the Earthquake Survivability of Structures on Soil Foundation
32. Agbabian Assoc.	El Segundo, CA	Investigation of the Seismic Resistance of Interior Building Partitions
33. Agbabian Assoc.	El Segundo, CA	Mitigation of Seismic Hazards in Tilt-up-Wall Structures
34. Higgins, Auld & Associates, Inc.	Albuquerque, NM	Establishing a National Testing Capability for the Simulation of Earthquake Loads on Large-Scale Structures
35. Iffland Kavanagh Waterbury	New York, NY	Earthquake Hazard Mitigation by Friction Cells Damping
36. Ruthroff, Englekirk and Hart, Inc.	Los Angeles, CA	Earthquake Damage Evaluation
37. Space for People	Los Angeles, CA	Methodology for Evaluating and Improving Operational and Non-Structural Aspects of Office Buildings
38. Weidlinger Associates	Menlo Park, CA	Response Surface Method in Geotechnical/Structural Analysis

Topic 11 - Science and Technology to Aid the Handicapped

39. Annex Research	Santa Ana, CA	Electrodes to Aid the Handicapped
40. Polysciences, Inc.	Warrington, PA	The Effect of Chemical Modification of Bone Cements on Their Young's Moduli
41. Scientific Systems, Inc.	Cambridge, MA	Microprocessor-Based Integration of Artificial Reflexes & Sensory Feedback for Prosthetic Control
42. Signal Technology, Inc.	Santa Barbara, CA	Voice Response Aids for the Handicapped

FIRM	LOCATION	PROJECT TITLE
43. Signatron, Inc.	Lexington, MA	Enhancement of Speech Intelligibility for the Hearing Impaired
Topic 12 - Appropriate Technology		
44. Aerospace Research Corporation	Roanoke, VA	Cost Reduction in Irrigation Well Pump Application
45. Dufresne-Henry, Inc.	North Springfield, VT	An Inexpensive Biologic Method of Upgrading Lagoon Effluent
46. Cal Recovery Systems, Inc.	Richmond, CA	Testing and Evaluation of Equipment Used in Recycling Centers
47. Control Dynamics Company	Huntsville, AL	Correlation Between Early Linear Measurements and Future Performance and Carcass Characteristics in Cattle
48. Donohue & Assoc., Inc.	Sheboygan, WI	Small Scale Reclamation/Disposal of Toxic Porcelain Enameling Wastewater Sludges
49. Electro-Chlor Corporation	Worthington, OH	Small Purification Systems
50. Flowerfield Enterprises	Kalamazoo, MI	Biodegradable Solid Waste Conversion Into Earthworm Castings
51. Floyd Browne Assoc., Ltd.	Marion, OH	Managing a Small Scale Solid Waste Resources Recovery Facility
52. Glass & Ceramics Internat'l, Inc.	Lomita, CA	Development of Mineral Wool from Industrial Wastes
53. Internat'l Science & Technology Institute, Inc.	Washington, DC	Permanent Cropping System for Small-Scale Farms
54. George D. Ward & Associates	Portland, OR	Elimination of Septic Tank Sludge Transport via Truck

Topic 13 - Applied Research Project Support

FIRM	LOCATION	PROJECT TITLE
55. Anthropology Research Project, Inc.	Yellow Springs, OH	An Anthropometric Data Base for Commercial Design Applications
56. Applied Forecasting & Analysis, Inc.	Palo Alto, CA	Supply-Oriented Regional Macroeconometric Forecasting Model
57. Artech Corp.	Falls Church, VA	Improvement of the Transverse Strength of Graphite/Aluminum Composites by Hybridization with SiC Whiskers
58. Fiber Materials, Inc.	Biddeford, ME	Investigation of the Super Plastic Drawing of Acrylic Fibers
59. Intermagnetics General Corp.	Guilderland, NY	Hydrostatic Extrusion of In-Situ Process Superconductive Wire for Use in NMR Magnets
Ionex Research Corporation	Broomfield, CO	Alternative Silver Zeolite Concepts
61. Osborne-Hoffman, Inc.	Point Pleasant Beach, NJ	Advanced Underwater Telemetryand Voice Links for Inland and Coastal Waters Research
62. R. F. Monolithics, Inc.	Dallas, TX	Theoretical Modeling of an Innovative Unidirectional Surface Acoustic Wave Transducer

NATIONAL SCIENCE FOUNDATION

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

PHASE I AWARDS - SEPTEMBER 1979

	FIRM	LOCATION	PROJECT TITLE	AMOUNT
Topic 1 - Chemical Threats to Man and the Environment				
1.	Environmetrics, Inc.	St. Louis, MO	Personal Dosimeter for Anesthetic Gases	$24,973
2.	Hazen Research, Inc.	Golden, CO	Separation of Radium-226 and Thorium-230 from Uranium Ore	$24,600
3.	Ionomet Co., Inc.	Brighton, MA	Vapor Deposited Silver Halides for Thin Layer Chromatography	$24,980
4.	Lancaster Laboratories, Inc.	Lancaster, PA	Research on a Rapid and Simple Detection Method for Asbestos	$21,210
Topic 2 - Alternative Biological Sources of Materials				
5.	Ecoenergetics, Inc.	Richmond, CA	Polysaccharide Production by Microalgae	$24,696
6.	EIC Corp.	Newton, MA	Low Temperature Thermoconversion of Biomass to Useful Chemicals by Lewis Acid Catalysts	$22,024
Topic 3 - Human Nutrition - No awards				
Topic 4 - Science and Technology to Aid the Physically Handicapped				
7.	Telesensory Systems, Inc.	Palo Alto, CA	Investigation of PVF_2 Tactile Stimulators for the Optacon	$24,640

	FIRM	LOCATION	PROJECT TITLE	AMOUNT
8.	Threshold Technology, Inc.	Debran, NJ	Low-Cost, High Performance Speech Recognizer for the Handicapped	$25,000
9.	Universal Textile Machine Corp.	Lawrence, MA	Development of a Micro-Solenoid Operated Braille Display Cell	$25,000
10.	Vibrasound Research Corp.	Denver, CO	Hearing Aids for Spatial Perception and Localization	$24,815
Topic 5 - Advanced Production and Manufacturing Processes				
11.	Advanced Mechanical Technology, Inc.	Newton, MA	Cutting Force Measurement in Production Machining via Instrumented Tool Holders	$25,000
12.	Amex Systems, Inc.	Hawthorne, CA	Mini Arc Welding	$24,031
13.	AMPEC Corp.	Winchester, MA	Research on the Optimization of Viscous Fluid Mixing	$20,475
14.	The Bethesda Corp.	Silver Spring, MD	Torque Limiting Sockets for Impact Wrench	$25,000
15.	L.N.K. Corp.	Silver Spring, MD	Recognition of Parts and Their Orientation for Automatic Machining, Handling and Inspection	$25,000
16.	Machine Intelligence Corp.	Atherton, CA	Microcomputer-based Natural Language Understanding	$25,000
17.	Radiation Monitoring Devices, Inc.	Watertown, MA	Photovoltaic Detectors for High Intensity X-ray Measurement	$25,000
18.	Scientific Process & Research, Inc.	Highland Park, NJ	On Line Direct Digital Control of Extrusion Processes	$24,985
19.	Xytel Corp.	Lombard, IL	Research on an Interactive/Microcomputer Technique for Balancing Assembly Systems	$23,625

	FIRM	LOCATION	PROJECT TITLE	AMOUNT
Topic 6 - Measurement and Advanced Instrumentation				
20.	Advanced Mechanical Technology, Inc.	Newton, MA	Magnetic Sheet Steel Lamination Detection	$25,000
21.	Advanced Research & Applications Corp.	Sunnyvale, CA	X-Ray Optics for Projection Lithography	$24,993
22.	American Liquid Xtal Chemical Corp.	Kent, OH	New Instrumentation for Temperature Measurement	$25,000
23.	EIC Corp.	Newton, MA	Electrochemical Evaluation of the Electronic and Transport Properties of Silicon	$24,366
24.	Ionomet Co., Inc.	Brighton, MA	Vacuum Deposited Silver Halide as an Electron Resist	$24,987
Topic 7 - Materials and Processes				
25.	Browning Engineering Co.	Hanover, NH	Extreme Impact Velocity Metal and Ceramic Deposition	$25,000
26.	Crystal Systems	Salem, MA	Growth of Ruby Crystals by Heat Exchange Methods	$25,000
27.	Glass & Ceramics International, Inc.	Lomita, CA	Energy Conservation in the Building Industry by Using Industrial Waste Materials	$24,996
28.	Bio-Metric Systems, Inc.	Minneapolis, MN	Affinity Crosslinking for Enzyme Technology	$24,989
29.	Liquid Chemical Co., Inc.	Hanford, CA	Selective Membrane Separation of Fine Solids	$25,000
30.	Quantronix Corp.	Smithtown, NY	Dual Wavelength Laser Thermal Processing of Semi-Conductors	$24,960

	FIRM	LOCATION	PROJECT TITLE	AMOUNT
31.	Spire Corp.	Bedford, MA	A Novel Technique for Fabricating Optoelectronic Materials	$25,000
32.	Spire Corp.	Bedford, MA	Semiconductor Processing by Electron Beam Pulse - Induced Surface Reactions	$25,000
33.	W. J. Schafer Assoc.	Wakefield, MA	Laser Purification of Silane	$23,350
Topic 8 - Deep Mineral Resources				
34.	Emtec Engineering, Inc.	Berkeley, CA	Computer Modeling of Electromagnetic Responses from Deep Mineral Resources	$24,691
35.	LuTech, Inc.	Berkeley, CA	Geophysical Probing by Probabilistic Potential Theory	$25,000
36.	Utah Geophysical, Inc.	Salt Lake City, UT	Feasibility Study for a Seismic Drill Bit Location and Guidance System	$24,675
37.	Utah Geophysical, Inc.	Salt Lake City, UT	Seismic Fracture Mapping	$24,938
Topic 9 - Marine Resources				
38.	Thomas H. Herbert, PhD	Tallahassee, FL	The Design and Field Testing of a Dual-Species Trap to Capture Spiny and Scyllarid Lobsters	$24,915
Topic 10 - Plant Productivity				
39.	Great Western Research	Mesa, AZ	Economic Evaluation of On-Farm Salinity Mitigation Options	$22,991
40.	K. M. Nursery, Inc.	Carpenteria, CA	Clone Propogation of Jojoba via Tissue Culture	$24,724

	FIRM	LOCATION	PROJECT TITLE	AMOUNT
Topic 11 - Reclamation of Wastewater and Sludges				
41.	Cal Recovery Systems, Inc.	Richmond, CA	Benefits and Problems of Refuse-Sludge Composting	$19,599
42.	D. B. Clayton & Assoc.	Houston, TX	Removal of Silica from Cooling Water for Activated Alumina	$25,000
43.	EIC Corp.	Newton, MA	Chromium Recovery from Tannery Industry Wastes	$24,931
44.	Gravi-Mechanics Co.	Naperville, IL	The Entrapment, Concentration and Recovery of Heavy Metals from High-yield Exhausts by Use of Stabilized Soil Adsorption Beds	$24,970
45.	Rickel Manufacturing Corp.	Salina, KS	Utilization of Wastewater Sludge by Simultaneous Injection of NH_3 and H_3PO_4 for Complete Crop Nutrient Requirements/Sludge Plus	$25,000
46.	Sonic-Clean, Inc.	Kenner, LA	Application of Ultrasonics and Electrostatics in Wastewater Treatment and Disinfection	$25,000
Topic 12 - Applied Research Project Support (Open)				
47.	Drilling Research Lab, Inc.	Salt Lake City, UT	Oil Recovery Enhancement by Acoustic Means	$24,995
48.	Eikonix Corp.	Burlington, MA	Selective Thermal Radiators	$24,987
49.	Intertechnology/ Solar Corp.	Warrenton, VA	Pressure Harvesting of Microalgae	$23,431
50.	Richard Jablin & Assoc., Inc.	Wrightsville Beach, NC	Low Cost Oxygen for Blast Furnaces	$24,820
51.	Lifesystems Co.	Newton, MA	Formation of Monodisperse Amphipathic Bilayer Structures	$25,000

	FIRM	LOCATION	PROJECT TITLE	AMOUNT
52.	Research for Growth & Transfer, Inc.	Houston, TX	A Methodology for Using Non-Linear Engineering Design Functions	$25,000
53.	Spin & Space Systems	Phoenix, AZ	Magnetic Suspension for Rotating Equipment	$24,225
54.	Waste & Land Systems, Inc.	Ft. Collins, CO	Computer Analysis of Seepage and Groundwater Response Beneath Tailings Impoundments	$25,000

RANN SMALL BUSINESS INNOVATION AWARDS

OCTOBER 1977

Topic 1 - Hydrometallurgical and Solvent Extraction of Minerals (Resources)

Company	Project Title	Phase I Award
EIC Corporation Newton, Mass.	Recovery of Chromium from Nickeliferous Laterites	$24,740
Garrett Energy Research & Engineering Co., Inc. Claremont, Cal.	Solution Mining Process Using Ion Exchange	$25,000
Bend Research, Inc. Bend, Oregon	Coupled Transport Membranes for Metal Recovery	$24,988
Giner, Inc. Waltham, Mass.	The Development of Electrochemical Methods for the Enhancement of Floatation Extraction with Specific Reference to Chromium Ores	$24,960
Moleculon Research Corporation Cambridge, Mass.	Bound Liquid Membranes for Hydrometallurgical Processing	$24,938

Topic 2 - Feasibility of Introducing Food crops Better Adapted to Environmental Stress (Resources)

Soil and Land Use Technology, Inc. Columbia, Md.	Feasibility of Introducing Food Crops Better Adapted to Environmental Stress	$24,919

Topic 3 - Chemical Threats to Man and the Environment (Environment)

SISA Inc. Cambridge, Mass.	Mycotoxins as a Potential Human Health Hazard	$25,000
Fein-Marquart Associates, Inc. Baltimore, Md.	Approachs for the Acquisition of Mass Spectral Data for Inclusion in the NIH/EPA Mass Spectral Data Base	$24,874
Western Chemical Research Corporation Fort Collins, Colo.	Development of Antisera to Benzo(a)-pyrene and Its Metabolites	$25,000

Topic 3 (Cont'd)

Moleculon Research Corporation Cambridge, Mass.	Reactive Tapes for Automatic Environmental Analyses	$24,805

Topic 4 - Societal Demand Technology (Productivity)

Block Engineering, Inc. Cambridge, Mass.	Single Ended Photoelectric Switch	$24,495
Scientific Process & Research, Inc. Highland Park, N.J.	Lowering of Energy Consumption in Plastics Processing	$25,000
Precision Instrument Company Santa Clara, Cal.	SlideStore:$^{(TM)}$ Large Capacity Information Storage	$24,995
Terraspace, Inc. Rockville, Md.	Hydraulic Bursting of Concrete and Rock	$25,000
Ceramic Finishing Company State College, Pa.	Control of Fragment Size Distribution and Damage Penetration During Machining of Ceramics	$24,942

Topic 5 - Improving the Productivity of the Physically Handicapped (Productivity)

Multisystems, Inc. Cambridge, Mass.	Remote Employment of the Physically Handicapped	$24,948
Scientific Systems, Inc. Cambridge, Mass.	Microprocessor - Based Prosthetic Control	$23,670
Integrated Sciences Corporation Santa Monica, Calif.	Visual Feedback Speech Training System for the Deaf	$24,273

Topic 6 - Food Substitutes and Compolsite Materials (Technology Assessment)

Argos Associates, Inc. Winchester, Mass.	Technology Assessment - Advanced Composite Materials	$24,923
The Futures Group Glastonbury, Ct.	A Technology Assessment of Vegetable Substitutes for Animal Protein as Human Food	$24,992
Applied Engineering Resources, Inc. Santa Barbara, Cal.	Technology Assessment: Advanced Composites	$24,969

Topic 7 - Resources, Environmental, and Productivity

Resources

Collaborative Research Inc. Waltham, Mass.	Enhancement of Animal Protein Production by Novel Genetic Technology	$24,997
Biospherics, Inc. Rockville, Md.	Bioconversion of Saline Water	$25,000

Environment

Earthquake Engineering Systems, Inc. San Francisco, Cal.	A Rational Approach to Damage Mitigation in Existing Structures Exposed to Earthquakes	$20,095
IRT Corp. San Diego, Cal.	An Immonochemical Assay for Asbastos in the Environment	$24,854
S. B. Barnes & Associates Los Angeles, Cal.	Methodology for Mitigation of Seismic Hazards in Existing Unreinforced Masonry Buildings - Design Methods for Determining Need for Hazard Mitigation and Methods of Retrofit	$25,000
Kariotis, Kesler & Allys South Pasadena, Calif.	Mitigation of Seismic Hazards in Existing Unreinforced Masonry Wall Buildings: Performance of Undesigned & Modified Elements: Evaluation of Modification Methods	$24,393
Applied Nucleonics Company, Inc. Los Angeles, Cal.	A Portable Vibrating Structure for Soils Investigations	$24,282
Agbabian Associates El Segundo, Cal.	Methodology for Mitigation of Seismic Hazards in Existing Unreinforced Masonry Buildings -- Response of Existing Systems to Earthquake Motion	$25.000
George D. Ward & Associates Portland, Oregon	Controlled Soil Microbial Detoxification of Hebicide Residues	$25,000
Martin & Cagley Rockville, Md.	Seismic Hardening of Unreinforced Masonry Walls Through A Surface Treatment	$25,000

Topic 7 (Cont'd)

Scientific Service, Inc Redwood City, Cal.	The Use of Structural Foams to Improve Earthquake Resistance of Buildings	$24,517

Productivity

Terra Tek, Inc. Salt Lake City, Utah	Research on the Simplification of Methods for Measuring Fracture Toughness	$24,993
Amtech Incorporated Newton, Mass.	Micro-Isotope Tool Wear Detection	$25,000
Terra Tek, Inc. Salt Lake City, Utah	Hydromechanical Sensing of Deep Hole Drilling Deviations	$24,970
International Diagnostic Technology Santa Clara, Cal.	Improved Methods for the Rapid Detection of Microbial Contaminants	$25,000
IRT Corporation San Diego, Cal.	In-Vitro Detection of Allergy Using Human Head Hair	$24,646
Kellogg Corporation Littleton, Colo.	Resource Allocation for Construction Industry Managers	$24,953

Exploratory Research (Appropriate Technology)

Oriental Engineering and Supply Company Palo Alto, Cal.	Waste Food Disposal and Utilization	$25,000

Research and Development Incentives

Sea Otter Trawl Arlington, Mass.	Low Drag Trawl Board	$17,500
Plastics Technology Associates, Inc. Breton Woods, N.J.	Composite Materials Comprising Reaction-Injection-Molded Combinations of Carbon Fibers and Thermosetting Resins	$24,725
Ionomet Company Waban, Mass.	An Urgently Needed Mass Spectrometry Photoplate for Environmental Trace Element Research	$25,000

FY 1977 SMALL BUSINESS SOLICITATION

INFORMATION ON PHASE II AWARDEES

	State	Phase II Amount	Employment		University Coupling	VC Outlook
			In Propos.	Now		
Topic 1 - Hydrometallurgy						
1. Bend Research	OR	$103,000	10	26	No	Interest, no commitment
2. Moleculon Research	MA	330,392	14	20	MIT	Letter of interest
Topic 2 - Food Crops and Environmental Stress						
3. Soil & Land Use Tech	MD	236,265	2	34	U. Mo.	$130K contract in process Two add'l possibilities
Topic 3 - Chemical Threats						
4. SISA, Inc.	MA	188,040	19	35	MIT	Depends on research results
5. Western Chem. Res. Corp.	CO	56,872	0	6	Col. State	No com. now, maybe later
6. Moleculon Res. Corp.	MA	289,241	14	20	MIT	$220K com. from Norton Co. w/$35K invested; plus $10K from Dow Chemical
Topic 4 - Production Processes						
7. Scientific Proc. & Res.	NJ	200,000	8	12	No	$200K commitment
8. OMEX	CA	147,750	45	98	U. IA, TX, AZ	Rec'd $2M venture capital
9. Terraspace, Inc.	MD	136,852	3	2	U. MD	Letter of interest
10. Ceramic Finishing Co.	PA	143,134	4	8	Penn State, URI	Good: Ford, GM
Topic 5 - Physically Handicapped						
11. Scientific Systems	MA	94,886	6	32	Tentative MIT	Liberty Mutual interested
12. Integrated Sciences	CA	118,801	16	14	UCLA, UCSB, CUNY	Too early
Topic 6 - Technology Assessments						
(none)						

Topic 7 - Applied Science - Open	State	Amount	Employment At Award	Employment Now	University Coupling	VC Outlook
13. Collaborative Research	MA	$239,378	33	70	Harvard	Rec'd $5M from lg industrial Drug co funding also possib
14. Agbabian Associates	CA	922,042	57	57	UC Berk, UCSD	Service
15. S.B. Barnes	CA		17	16	"	
16. Kariotis, Kesler & Allys	CA		9	12	"	
17. George D. Ward & Assoc.	OR	183,445	3	5	Miss St., OR St.	Rec'd $3K, more possible
18. Terra Tek	UT	219,322	85	203	U of Mich, Utah, Brown, MIT	New product on market
19. Advanced Mech. Tech.	MA	186,408	6	28	MIT	Excellent depending on NRC
20. Terra Tek	UT	151,272	85	203	Caltech, Minn, Utah, UC Berk, MIT, TX A&M	Com'l potential
21. Ionomet Co.	MA	240,328	1	8	MIT	$240K commitment
Total	8	$4,278,028	437	876		

NATIONAL SCIENCE FOUNDATION

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

PROPOSALS AND AWARDS BY STATE - PHASE I

	Proposals Received					Awards				
	1977	1979	1980	1981	Total	1977	1979	1980	1981	Total
Alabama		1	4	8	13			1		1
Alaska		1			1					
Arizona	5	3	5	5	18		2	1		3
Arkansas				4	4					
California	84	78	100	156	418	14	11	17	15	57
Colorado	11	19	22	16	68	2	3	1		6
Connecticut	8	4	7	11	30	1		1	2	4
Delaware		1		1	2					
Florida	4	7	14	8	33		1		1	2
Georgia	2	2	1	3	8					
Hawaii	1	1	4	5	11			1	1	2
Idaho	2			5	7					
Illinois	3	12	12	13	40		2			2
Indiana	1	3	5	1	10				1	1
Iowa		2	2	5	9					
Kansas	1	1	5	1	8		1			1
Kentucky			2	1	3					
Louisiana	1	1	2		4		1			1
Maine		3	5	5	13			1	3	4
Maryland	27	31	38	46	142	5	2	3	8	18
Massachusetts	52	66	52	106	276	13	16	6	22	57
Michigan	5	5	1	10	21			1	3	4
Minnesota	1	3	6	7	17		1	1	1	3
Mississippi		1			1					
Missouri	3	2	4	4	13		1			1
Montana	1		2	4	7				1	1
Nebraska	1		2	1	4					
Nevada	2		1	2	5					
New Hampshire	2	5	9	2	18		1			1
New Jersey	11	21	26	17	75	2	2	1	1	6
New Mexico		1	5	11	17			1	2	3
New York	16	35	45	44	140		1	6	3	10
North Carolina		4	4	4	12		1		1	2
North Dakota			2		2					
Ohio	7	8	20	27	62		1	4	2	7
Oklahoma	2		2	5	9					
Oregon	4	5	6	5	20	1		2		3
Pennsylvania	13	15	18	23	69	2	1	3	3	9
Rhode Island		2	1	4	7				1	1
South Carolina		1	1	5	7				1	1
South Dakota										
Tennessee	2	2	6	3	13			1	1	2
Texas	15	13	22	23	73		2	2	2	6

	Proposals Received					Awards				
	1977	1979	1980	1981	Total	1977	1979	1980	1981	Total
Utah	6	10	13	22	51	2	3	3	2	10
Vermont		2	2		4			1		1
Virginia	15	22	29	26	92		1	2	2	5
Washington	10	3	12	31	56				4	4
West Virginia	1	4		3	8				1	1
Wisconsin	4	5	4	7	20			1	1	2
Wyoming		1	2		3					
Dist. of Columbia	6	2	5	7	20			1		
	329	408	530	697	1964	42	54	62	85	243
States	34	41	43	43	49	9	20	23	26	36
DC	1	1	1	1	1			1		1

Mr. FUQUA. Thank you very much, Mr. Bedell.

Yesterday in hearings we had Senator Rudman, who is the sponsor of the Senate-passed bill, and Senator Kennedy, who supported that, and they testified that they felt that the 3-percent set-aside was too high, that it should be 1 percent. Senator Rudman, after several questions, said they started at a higher figure and a lower figure and concluded that the 1-percent was the optimum level.

The bill we have under consideration has 3 percent. How was this arrived at, at 3 percent rather than a higher figure or a lower figure?

Mr. LAFALCE. Mr. Chairman, first of all we do not go to 3 percent immediately. As you well know, we phase it in over 4 years, starting at half of 1 percent.

I suppose that anybody who has sponsored a bill with a 1-percent figure would think that is the optimum, and someone who sponsored a bill with a 3-percent figure would feel that is the optimum.

Also, I think it is easier to get a bill through when there is a certain amount of opposition if you go in lower than you really should. The Senate was able to obtain fast passage with a 1-percent figure. Maybe if we had come in with a 1 percent figure, the bill's passage could have been faster and maybe we wouldn't have had so many sequential referrals. Certainly, though, the Science and Technology Committee should have had a sequential referral. We have also had referrals to the Armed Services, Veterans Affairs, and Energy and Commerce Committees. But I do believe 3 percent is small.

I don't know what the optimum figure really should be. It reminds me a litle bit of my law school days, when the professor said: "Now we have to establish the fact that a horn ought to be honked before you approach the intersection. Let's accept that. Let's say that the intersection is the length of a football field away. Then should you honk when you are 1 foot away or 1 yard away from the intersection?"

What we are doing here is playing it awfully safe. We are honking when we are 97 yards away. I don't see how anybody could find fault with 3 percent; I think that is small.

Now, I am not cast in concrete on that. If you want to increase it, I would certainly go along.

Mr. **Fuqua**. The administration testified yesterday that they opposed the 3 percent and supported the 1-percent contained in the Senate bill. I was reviewing the report of your bill and in the report it really didn't give any rationale as to how the 3 percent was arrived at and I was asking for some information.

Mr. **Bedell**. I feel the Small Business Committee's 3-percent bill is quite reasonable. We started with the fact that firms with 100 or fewer employees produce 24 percent of innovations and firms with 1,000 or more produce more than half of all innovations. Accepting that, you wouldn't go with the 3 percent. You would go with a much higher figure than that if you were concerned about efficiency in government. The fact of the matter is 3 percent was about as high as we thought we could go and get it accepted.

I don't know how high we can go and get the administration to support it. I am pretty sure that if the House goes with 1 percent and the Senate goes with 1 percent we are not going to have it any higher than 1 percent. It surely can be justified that if small business is providing anywhere from a fourth to a half of all innovation that 3 percent is not an unreasonable figure, particularly, as John mentioned, when you build it up over a number of years.

Mr. **LaFalce**. If I might add to Congressman Bedell's remarks, with which I concur fully, that if the administration believes 1 percent is appropriate for small business, so be it. That is their position. I think it ought to be the position of the House of Representatives that 3 percent is appropriate. Perhaps we are more concerned about small business than the administration.

Now if it is necessary to compromise in order to get a bill passed, so be it. We will be willing to compromise. I facetiously said we would be glad to go up and, of course, if it is necessary to get a bill through both Houses and signed by the administration at somewhere between 1 and 3, well, reasonable men will have to give on both sides. But let our position be clear. We think the small business community is deserving of much better than 1 percent.

Mr. **Fuqua**. One other question that came up yesterday dealt with the fact that instead of having the SBIR program administered by the Small Business Administration it would be better to have it administered by the Office of Federal Procurement Policy. Do you have any thoughts about that?

Mr. **LaFalce**. The Office of Federal Procurement Policy, as you know, has a clear, explicit statutory role under this bill. The Office of Science and Technology has a clear statutory role, also. The only question is, Which would be the lead agency?

Insofar as the lead agency is concerned, from my experience with the Office of Federal Procurement Policy. I think they have virtually total disregard for the needs of the small business community. If I may say, Mr. Chairman, putting the Office of Federal Procurement Policy in charge of SBIR would be like putting Dave Stockman in charge of the Superfund legislation that he opposed so vehemently as a Congressman on the floor of the House when you and I were trying to establish it.

Mr. **Fuqua**. The percentage in the House version of the bill applies only to the SBIR. Should 1 percent apply to all small business R. & D.?

Mr. LaFalce. If you will, 3 percent should apply to the total research budget as far as I am concerned.

Mr. Fuqua. Including the mandated programs that we have now?

Mr. LaFalce. I think it should include all, but that is a subject for negotiation.

Mr. Fuqua. Mr. Brown?

Mr. Brown. I want to commend both of you for your assiduous pursuit of the objectives of revitalizing a declining economy and thank you for the amount of work and thought that has gone into this legislation. I have been wrestling with this problem for some time and I don't know that any of us have come up with a final answer to it.

I am sure both of you recall that in the last Congress we passed legislation called the Stevenson-Wydler Act, which had many of the same objectives of this, although it attacked the problem from the standpoint of sharing the results of scientific and technological development generated by Federal dollars with the small business and other communities so as to enhance their capabilities.

The point that continues to worry me is that our declining competitiveness in our economic competition with other nations seems to stem from a lack of focus by our own business community in this country on longer range market opportunities instead of placing emphasis on short-term profitability. You have pointed this out in your statements, and most people have.

We do not have any function, any part of the government whose responsibility is really the stimulation of private commercial economic development, marketing products for the benefit of the society in general. We have mission oriented agencies, such as the Pentagon, which likes to develop new technologies for defense purposes; energy, which develops new technologies for energy; others which have a specific mission orientation but none which is concerned really with what basically the American economy needs to maintain its competitive posture with regard to the rest of the world.

Hence, I am a little disturbed as to what any government department, in allocating 1 percent or 3 percent of the R. & D. funds for the purpose of this bill, to innovative, high-technology small business for new innovations, how it would go about making the decision or making the allocation of funds in such a way as would be good for the American competitive market. They are not in the business of doing that, in other words.

Mr. LaFalce. We have a phased-in program, and the first phase is consideration of whether the proposal of the small business recipient of earmarked funds has scientific and technical merit. As a matter of fact, we started off with different criteria with members of the staff of the Science and Technology Committee that led us eventually to change the criteria.

Insofar as who within the Government has the wisdom to do this, certainly within NSF—which is administering a program right now—that knowledge is there. In other countries where there is a greater interface between government and the private sector, such as Japan, there doesn't seem to be a problem. It seems to be flourishing.

I think I agree with virtually everything you said, Mr. Brown, but it seems to me we have to do all of those things you were talking about. We do have to try to orient the public and the private sector to long-range rather than short-range thinking. We do have to try to stimulate innovation in a great many different ways, and I think that this is one of those ways. We do have to try to foster better labor-management cooperation. There is a whole range of things we have to do. This Small Business Innovation Development Act is one part of what we must do, but it is a major part and it does involve an interface between the public and the private sector.

The Government has historically given us such better development of Federal dollars that we are going to insure that a certain amount of money in the future shall go to the small business sector in a separate program. Historically, that money hasn't gone in that direction and it wouldn't go without this type of program.

Mr. **Brown**. I understand that. In fact, I am very supportive of a flow of money going to this particular segment of the economy, but I am trying to straighten out in my mind if basically this is aimed at moving along the process of technological development. It may be that the small business firm that goes in with a proposal is going to—in all probability going to an agency that is going to have a program of this sort, what proposal that has nothing to do with the mission of that agency.

Mr. **Bedell**. One of the things in this bill is that agencies are to consider unsolicited proposals. The gentleman has hit upon something that I also perceive as a problem. I share the belief that we ought to turn this innovation loose so it won't get boxed in by the bureaucratic discretions.

Sure it is true big business is not looking out to the future in the way I would like to see them do. For example, I am the chairman of the Energy Subcommittee of the Small Business Committee. One of the things we are looking into is battery technology. The problem is most of our battery companies are simply trying to make better lead acid batteries because that is where the market is today, rather than looking out at what kind of a battery might allow us to move forward into the future.

I think we need to get part of that creativity in part of this bill, to encourage unsolicited proposals so we can open up new opportunities. In my opinion, my colleague has asked a very important question and in my opinion this bill directly addresses that particular concern if we understand each other correctly.

Mr. **Brown**. I think the bill will produce some considerable value but because there is no agency of the Government, with minor exceptions, charged with the responsibility, really, for the health of the processes of technological development in our society, any program aimed at that is going to have to go for money to an agency which does not have that mission. I am just wondering how this is going to operate.

I would prefer, if I had my druthers, in the best of all possible worlds, to see a system under which we would recognize if we are going to compete effectively in the world that should be a specific responsibility at least at the policy level of the Government, and they would do some of the things that are being done by Japan to encourage this. But I don't see this is the complete answer to it because of this hiatus that we have.

Mr. **Bedell**. I think you are right, but I think it moves us in the direction of the answer. Certainly we are more likely to get in that direction if this bill encourages unsolicited proposals. If one of your constituents comes to you and says, "Look at this tremendous idea I've got," you certainly would have a better chance of getting something done about it through the agencies than you would in the absence of this bill.

Mr. **Brown**. This committee, of course, went through this whole exercise in connection with the functions of the Energy Department. We felt that the Energy Department, whose specific mission is the encouragement of new energy technology, should have facilitated all sorts of proposals by innovative small firms. We put into legislation programs to do that, some of which were reasonably successful and all of which are now being terminated by this administration.

Now I ask myself why is this program going to be so much better than a specifically targeted program which was set up to achieve just this purpose within a mission agency which had the responsibility of doing something about the commercial development of new technology.

Mr. **Bedell**. I don't think anybody would claim this would solve those problems. I would claim that with this legislation you have a better chance of solving the problem you speak of than you do without it, simply because the bill would encourage unsolicited proposals.

Mr. **Brown**. Let me pinpoint a specific example in the Department of Energy. You mentioned batteries. We have a promise to finance research in the new generation of better batteries. That is proposed to be eliminated by this administration.

Mr. **Bedell**. I am well aware of that, and Germany is spending millions of dollars to try to develop a new and better battery.

Mr. **Brown**. That is the contrast I am trying to face in my own mind and see how we got where we are here.

Mr. **Walgren** [presiding]. Thank you, Mr. Brown.

Apparently it falls to me next and then Mr. Fish.

I can't get over a feeling that in a sense our real purpose here is simply trying to inject some money into this sector of our economy and in so doing, we are taking it away from some other pocket or pool that had a purpose that was not necessarily in one and yet a very important purpose. I wanted to ask how much we know about the true deprivation of the small business sector.

If we are going to take money away from such research missions, such missions as were decided upon because of their critical importance to the public well-being such as the NIH or some kinds of more involved scientific exploration there might be very important breakthroughs lying for us in those mission areas, and now we are going to take a certain amount of funds and put them into a much more general, broad disbursement in hopes that it will have a good effect.

We are truly, in my view, giving up something of great importance to do this, and the question I have is how good is our economic assessment of the need to place these particular moneys in small business. It has been argued that through subcontracts small business actually does have a major participation in the Government research dollar.

Under your bill, would subcontracts that went to small business be counted in the 1 percent or 3 percent set-aside?

Mr. **LaFalce**. No.

Mr. **Walgren**. So it is just prime contractors we are dealing with.

What do we know of the present participation of small business at the subcontract level?

Mr. **LaFalce**. Do you mean exclusively for research and development, or are you talking about the total of small business subcontracting that takes place?

Mr. **Walgren**. I guess the question would be the infusion of money that originated in a research and development effort into small business.

Mr. **LaFalce**. When I coauthored with Mr. Bedell, Public Law 95-507, one of the important features of that was a program that set up procedures for greater small business subcontracting opportunities. I have been attempting to insure that the small business sector gets a much greater share of the Federal procurement dollars via the subcontract route, so I share your thoughts in that regard.

We have also established subcontracting goals which the agencies have by and large virtually ignored, and which the prime contractors have in large part ignored. It seems to me that there are inadequate penalties or incentives, as well as bureaucratic inertia, almost a disregard.

Insofar as the delineation of the total subcontracts given to small business into research and nonresearch, I am unable to give that to you at this time. Perhaps you have more information than I, or Congressman Bedell would.

Mr. **Bedell**. As author of one of the bills my objective was not what the chairman states. I don't believe we would be realistic if we were to say that we think this 3 percent of Federal research and development dollars is going to stimulate small business activity across the country.

My objective is to stimulate innovation in our society and to move us forward into what I think is a new and better society while getting the maximum return for the Federal dollars that are spent. It seems to me that on all three of these counts the way to do it is by involving small business to a greater extent. That was the intent of this gentleman as he worked on this legislation. I do have great concern over the health and viability of small business in our society. That has to do not only with innovation but with the type of society we are going to live in.

I was just aghast when one of the people in the present administration indicated he would see no great problem if there only were a few big corporations running everything in the United States. I don't want my kids to grow up in that kind of a society, and I don't think you want yours to. Whether it might be efficient or whether it might not be efficient.

It seems to me when you put all of these things together it just makes ultimate good sense to use the most efficient method we have of bringing on creativity by encouraging greater small business participation in Federal R. & D. activity.

Mr. **LaFalce**. There is a form, SF-295, a summary subcontract reporting form. It is my understanding that a great many universities are leading a drive to try to do away with or minimize that reporting form, which makes information about subcontracting more difficult to obtain.

Let me go to another aspect of your questior, though, Mr. Chairman. You asked if we are taking money away from a good whenever we deal with a set-aside program. We are making a judgment, but it is a judgment between two goods. Certainly research conducted by universities—and I think that is the gentleman's primary concern—is a good, and certainly research conducted by the small business community is good.

Individuals can approach a half a glass of water from different perspectives; calling it half full, calling it half empty. Being on the Small Business Committee, my orientation is to observe the good accomplished by the small business community more than other individuals would. But when I see reports that indicate that the innovation coming from small business research is 24 times greater than the research coming from other expenditures of our Federal dollars—maybe that is in error.

Maybe it is not 24 times. Maybe it is 12 times, maybe 10 times, maybe 4 times, maybe 2 times; there's a lot of room for error there. It seems to me we ought to give a greater percentage of our research money to small businesses than we presently do because there is a great disadvantage that small businesses have in competing for the research dollar.

They have all sorts of problems, one of which is cash flow, and so it is difficult for them to do research without some type of assistance. Maybe their biggest problem, though, is the old boy network that has existed within the Federal Government toward so many of the beneficiaries of Federal assistance for research purposes. Believe me, it is tough breaking through that old boy network.

What we are doing is just making a little bit of an inroad into it. We are saying, "Hey, we are going to set aside 3 percent," and we talk about that 3 percent, but that is a miminal amount to help break the logjam caused in large part I think by the bureaucratic old boy network we have and the other inherent difficulties that small businesses have in obtaining Federal moneys.

Mr. **Bedell**. The gentleman is correct. There is intermingling. I guess the question is if you are going to spend the money, are you going to give it to big businesses who tend, in my opinion, not to be particularly innovative and tend to want to hold things where they are, or give a little bit of the money to smaller firms which tend to be more interested in change and are more innovative? Either way I think you are going to see that money not all being held by either the big business or the small business. You will see subcontracts by small business on the big business awards. You will see work with the universities and contracts with the universities on both of them.

Mr. LaFalce. Mr. Chairman, may I also insert in the record at this time just a few of the many letters I have received from professors at various universities that strongly endorse H.R. 4326?

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99164-7040

DEPARTMENT OF VETERINARY MICROBIOLOGY AND PATHOLOGY

January 8, 1982

John J. LaFalce
Chairman
2361 Rayburn House Office Building
Washington, D.C. 20515

Dear Sir:

The purpose of this letter is to offer my enthusiastic support for H.R. 4326 Small Business Research and Development Innovation Bill. I am an employee of Washington State University and the Principal Investigator of a major research grant funded through the National Institutes of Health. Availability of research money is very important to me and I hope that increased funding will be made available for research in academic institutions.

I am impressed with the objectives of H.R. 4326 and do not view this bill as a threat to my funding concerns for universities. I firmly believe that small innovative companies will make research advances of substantial value to the tax payers of the United States. In my experience, the areas of research conducted by universities and small businesses do not usually overlap. In many instances, the practical benefits are more rapidly achieved from applied research conducted by small businesses with a profit motive. For these reasons, I offer my support for H.R. 4326 and encourage you to work for its passage.

Sincerely,

Lance E. Perryman
Lance E. Perryman, D.V.M., Ph.D.
Associate Professor

LEP:ew

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99164-7040

DEPARTMENT OF VETERINARY MICROBIOLOGY AND PATHOLOGY

January 8, 1982

John J. LaFalce
Chairman
2361 Rayburn House Office Building
Washington, D.C. 20515

Dear Sir:

This letter is in support of H.R. 4326 Small Business Research and Development Innovation Bill. As a research worker, I have been surprised at the delay between the discovery of useful information in the laboratory and the availability of this information and its use by the public. Implementing H.R. 4326 should speed application of research findings and ultimately increase the public esteem for research and research findings.

As a principal investigator of both N.I.H. and U.S.D.A. research grants, I am concerned about increased funding for disease related research. I do not view H.R. 4326 as a threat, but as a potential help in the application of my research findings. Therefore, I do encourage support for the passage of H.R. 4326.

Sincerely,

Travis C. McGuire, D.V.M., Ph.D.
Professor

TCM:ew

Mr. **LaFalce**. For example, let me read from just two of these letters:

> I am impressed with the objectives of H.R. 4326 and do not view this bill as a threat to my funding concerns for universities. I firmly believe that small innovative companies will make research advances of substantial value to the taxpayers of the United States. In my experience, the areas of research conducted by universities and small businesses do not usually overlap. In many instances, the practical benefits are more rapidly achieved from applied research conducted by small businesses with a profit motive.

Another letter:

> As a principal investigator of both N.I.H. and U.S.D.A. research grants, I am concerned about increased funding for disease-related research. I do not view H.R. 4326 as a threat, but as a potential help in the application of my research findings. Therefore, I do encourage support for the passage of H.R. 4326.

Now both of these are from university professors, and we have countless others from individuals in the academic community who believe that we need a greater working relationship, for example, in research, between the small business sector and universities.

Mr. **Walgren**. I appreciate the answers, and I think they are helpful and on point. I still feel, and perhaps might ask other witnesses, or perhaps if there is some submission that might be made by somebody knowledgeable, I still feel personally we are sort of flying in the dark as to the actual participation of small business in this range of dollars. From my own point of view I understand the difficulties that small businesses might have in competing for research grants and whatnot, but I tie that to what their basic economic strength is to begin with, and it would seem to me if they were participating in large percentages in this research effort to begin with, that we might be more comfortable in their ability to compete for truly meritorious projects.

I was thinking, for example, if we say they now receive less than 4 percent of the research and development funds, that means that 96 percent of the research and development funds on prime contracts are going elsewhere. But it seems to me it is a relevant question to ask, what is the disposition of the 96 percent. If, of the 96 percent, let's say a fifth or something like that were actually finding their way directly into the involvement of small business firms in this kind of research, that then we would be looking at a participation of 29 percent or 25 percent or something like that, of the small business community, and question then what is the proper balance.

So, I would just like to leave the thought open at this point and if anybody else has some suggestion that might help me out, I personally would appreciate it. I wish we had some firmer data on the subcontract participation. I understand your frustration in not being able to get that kind of data.

Mr. **LaFalce**. I understand your concern, Mr. Chairman. I certainly think it is a reasonable concern.

I personally don't think it would be anywhere near as high as what you are suggesting but, in addition, it would not be the type of research that the small business concern would necessarily want to do. It would be something that would be mandated by the prime contractor, which I think almost by definition would be less innovative than if the small business community were able to come up with its own ideas for research, rather than being told: "Here is what you should do." You almost stifle innovation by the very fact of subcontracting.

Mr. **Walgren**. I appreciate that.

The Chair recognizes Mr. Fish.

Mr. **Fish**. Thank you very much, Mr. Chairman. I certainly want to express my appreciation to our two colleagues before us this morning and for their leadership in bringing this matter to our attention.

There is one area that I don't think has been touched on that was brought up in the testimony yesterday by Senators Kennedy and Rudman, and that pertains to the intramural research or the in-house R. & D. Both the witnesses yesterday felt that to apply the set-aside provisions to intramural research would be unfair and that this research is often fundamental to completing the missions of Federal agencies.

Could either of you tell us why you do include intramural R. & D. in your bill?

Mr. **LaFalce**. Yes, I thought that a certain percentage of the total R. & D. dollar ought to go to the small business community. It was a question of whether or not we wanted to water that base down. I don't think that the Government really does the best research in the United States. I think the best research is done by the private sector, whether it is the university community, large businesses or small businesses, and I just didn't want to exclude intramural research from that total base.

Senators Rudman and Kennedy and I may have a disagreement, or maybe we don't in that they thought it would be easier to get administration and agency support if they exclude intramural research and so just gave in before they passed their bill. There may be a political ground for exclusion but not an intellectual one.

Mr. **Bedell**. I think Mr. Brown could answer this almost better than I can. Our whole assumption is we need new creativity that isn't going to be boxed in. If you leave it with the bureaucracy it is much more likely to be boxed in than if you turn it into the small business sector of our economy. I believe when we are talking about 3 percent that it sure makes some sense to take that small part and say, "We are going to cut some of this money out there where we have a greater chance for innovative creativity that doesn't fit into this particular box."

I know of very few people who would tell you if you really want to move forward with innovation the best thing to do is give money to some government agency and let them spend it. I believe that creativity needs to be opened up where we have the opportunity for more people to participate. I know of nothing that stifles things much more than Federal bureaucracy and I think the gentleman would agree with me.

Mr. **LaFalce**. Rather than exclude intramural research from the base as Senators Rudman and Kennedy would do, perhaps we would be better off just excluding intramural research.

Mr. **Fish**. Thank you, Mr. Chairman.

Mr. **Walgren**. The Chair would recognize Mr. Skeen.

Mr. **Skeen**. No questions.

Mr. **Walgren**. Mr. Dunn?

Mr. DUNN. I have no questions, Mr. Chairman.

Mr. WALGREN. Mr. Chairman?

Mr. FUQUA. I have no questions. I just want to thank our two colleagues for being here today and supporting the legislation. I think we are all very interested in a common goal, and I think the real question is how we get there. I appreciate your support in coming here this morning.

Mr. LAFALCE. Thank you very much.

Mr. WALGREN. I would certainly like to compliment you on the thrust of your testimony.

Mr. BEDELL. Thank you, Mr. Chairman.

[The prepared statement of Hon. J. William Stanton follows:]

STATEMENT BY HONORABLE J. WILLIAM STANTON (R-OHIO) ON H. R. 4326
SMALL BUSINESS INNOVATION RESEARCH BEFORE HOUSE SCIENCE AND
TECHNOLOGY COMMITTEE January 27, 1982

MR. CHAIRMAN: I am pleased to be invited to add my testimony to that of my colleague and the Chairman of our Small Business Oversight Subcommittee, Mr. LaFalce. Because of prior commitments I am unable to remain and answer questions, but I am anxious to have my remarks on behalf of this bill added to the testimony you have already heard from other sources.

Mr. Chairman, I am firmly convinced that this country is headed for disaster unless we can rally the vast resources and technology which we all know have made this country great and to put every single one of them to work in getting our economy back on the track to greater productivity and a bigger bang for every buck. I am firmly convinced that one of the ways we can begin to recapture the leadership of the world in the field of technology is to tap every scientific and technological brain among our population, and to encourage the development of new ideas and new methodology in the manufacture and production of goods and services. That is why I am supporting the concept of H. R. 4326, the Small Business Innovation Development Bill, which would encourage small-high technology firms to develop innovative ideas and to translate these into products which will bring America back to a competitive position in world markets.

We all know that technological innovation is critical to economic growth, and t hat our past achievements in such technology are what placed the U.S. in its position of world leadership in the first place. Unfortunately, the annual rate of increase of productivity for the U.S. has declined ten-fold over the past ten years and now lags behind that of the rest of the world's major industrial nations. This decline is what has caused our current economic problems: rising prices, decreased employment and increased foreign competition for U.S. industry. And our own government may have contributed to this decline by not insisting on utilizing the most efficient innovators in our national economy - small business.

Mr. Chairman, this is not a partisan issue. President Reagan has underscored his support of this legislation in a letter to Senator Warren Rudman, in which he said: "...Your concern that small firms be able to participate equitably in federal research and development is shared by this Administration. In the long run, all sectors of the economy are likely to benefit from the increased competition and research incentives your legislation would provide..."

We all know that small businesses have unique qualifications to perform research and development that large corporations can not duplicate. There is overwhelming evidence that the bulk of technological innovation comes from small high technology businesses and individual investors. Studies show that "firms of less than 1,000 employees have a ratio of innovations to R & D employment which is approximately four times greater compared to firms with more than 1,000 employees."

It is commonly acknowledged that small firms create the majority - nearly 70% - of new jobs in the United States. With our current rates of unemployment, this could be a significant step to help reduce those rates.

Research and Development spending is a crucial element in the innovation process. Over the past decade federal spending to support R & D has accounted for slightly more than one-half of all R & D funds. However, only a tiny fraction of that amount has gone to small businesses. While small business accounts for nearly 50% of the gross national product, they receive only about 24 percent of federal procurement funds and less than 4 percent of the federal R & D dollar.

The bill which we are asking you to support today, H. R. 4326, would earmark a small percentage of federal R&D dollars for small businesses. It would not reduce the overall R&D funds which the government spends, and it would only apply to federal agencies whose R&D budgets are over $100 million. Surely, a maximum of 3% of budgets over $100 million is not a great deal to channel into such economically productive channels. The actual 1982 estimated R&D budget of the Department of

Defense, for instance is $21,523,000,000. If this bill is enacted, 0.5% would amount to $107 million - not a sizeable amount in terms of our overall defense budget.

The National Science Foundation, which has run a successful pilot project along this line, has found that small businesses which received R&D funding from them (1) double their employment; (2) have established a number of new firms as a result of the program; (3) and have reported some fifteen new inventions, and a number of new products and processes, one of which is now sold worldwide.

Mr. Chairman, this bill will not "diminish the base of new knowledge," coming from basic academic research. It will establish a means for transferring the knowledge and results of university research to small science and high technology firms. Indeed, half the awards under the pilot program of NSF were to firms which were involved with universities, and most of them used university scientists and engineers as consultants. In many cases, there are joint projects.

I urge your committee to consider the merits of this bill, and to expedite its passage so that we can get on with the job of getting American productivity back on the track.

Thank you.

Mr. WALGREN. We appreciate your taking time to share with us your views as they relate to innovation. Let me first ask Dr. Tribus to proceed, and then Mr. Chilton.

STATEMENTS OF MYRON TRIBUS, DIRECTOR, CENTER FOR ADVANCED ENGINEERING STUDY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY; AND KENNETH W. CHILTON, ASSOCIATE DIRECTOR, CENTER FOR THE STUDY OF AMERICAN BUSINESS, WASHINGTON UNIVERSITY

Mr. TRIBUS. I appreciate being asked to testify on this bill. I might say my written testimony was prepared in close collaboration with Dr. J. Herbert Hollomon, who I believe is well-known to all of you. What we have to say in our written testimony does not represent the opinion of MIT but is our own opinion.

First of all, because I am going to say a number of things that are very critical of the bill, I want to tell you at the outset that we favor the bill but we believe that it needs some changes to meet its objectives, and I will talk about what those changes should be. Since most of my testimony will be concerned with what we find to be the shortcomings in the bill it may sound as though we are being very harsh on it and should be against it with so many criticisms. But when we get all through you will find we are in favor of the bill if it is changed, as we propose.

Our major concern with this bill is that it appears that it is just throwing money at a problem. Some people believe if money is thrown in a certain direction good things will happen. We believe that is not enough.

I would contrast the way we in the United States approach the problem of collaboration between government and business and the stimulation of technical enterprises with what is done in Japan. In particular, I would refer to a MITI report, the Ministry of International Trade and Industry.

In March 1980 they wrote a report, available in English translation, entitled "The Vision of MITI Policies in the 1980's." If you read the comprehensive approach they have for collaboration between government and business, you will see that it stands in sharp contrast to our own. They not only are concerned with funding but they are concerned with infrastructure. They are concerned with the work force. They are concerned with the education of engineers. They are concerned with the relations amongst various parts of industry. They are concerned with having an overall strategy for moving into the new era of knowledge industries.

They don't tell their people what to do, but they certainly work with them in developing a sense of strategy and purpose so that people can collaborate, and they do so in ways that are often forbidden in our own country.

Our comments fall into four categories. We want to talk a bit about the hypotheses that underlie this bill, explicit and implicit ones; about the objectives of the bill; about the administration of the bill; and about some missing ingredients, in particular, the evaluation of what happens when you put this money out. I want to emphasize that from the testimony I heard this morning and from what I have seen up to now makes it fair to say that all of us here really do not know what we are doing.

We do not have a data base that tells us what has been going on in the past. The major weakness of this bill is it does not set out to get data to find out what is happening now or what will be happening. We haven't even framed the right questions. I consider that the most serious deficiency of the bill and will come back to it at the end.

With respect to the hypotheses of the bill, that it is small businesses that create jobs, that explicit hypothesis is correct. I had a fairly lengthy conversation with David Birch, my colleague at MIT, regarding the data he has gathered even since his published reports. I can say not only his data but observers of the processes of innovation and decisionmaking in industry make it absolutely clear that the basic hypothesis of the bill is correct. Theoretically you expect it to be so, experientially it is so, as I have been in the middle of big business and little business and seen how things are decided. We understand that mechanism. That is probably the main reason we are interested in seeing a diversion of some funds to this purpose. I emphasize it is a diversion of funding from other purposes and a judgment has to be made by you as to which purposes are paramount. I want to come also to the issue of what that diversion means, where it might come from.

There are two other hypotheses in the bill which disturb me. They are not stated, and I hope I misinterpret them. One of them is the idea that you are going to write off big business. You have decided that they are hopeless, that big business is just going to be forever prosaic, like the big established armies getting ready to fight the last war, not the next one; not really marching into the future but being dragged into it screaming.

The problem is that that is just the experience with an overwhelming segment of American big business, but does not characterize all of American big business and it doesn't characterize a lot of big businesses in other countries. Sony by no means is looked upon as dull and lagging and afraid to take chances. There are lots of companies. In our own country, 3-M has a long history of innovation; and so does the Lord Corp.

There are many corporations in the United States that are in fact creative and innovative. I think the Congress ought to spend some time trying to understand what is going on with them. We are in deep trouble because of the losses of jobs in our automobile industry, because of their lack of innovativeness because the people there don't know how to run their business as well as their Japanese competitors. The losses there are extraordinarily large compared to what we are talking about gaining here.

I know the bill we are talking about today only concerns small business and the importance of using small business, but there are many other things to be concerned with and I have seen no action and no statements and no concerns on the part of the Congress other than to write off big business. I think that is a mistake. You can't have a trillion dollar economy made up of businesses that are all only 100 million. There have to be some billion dollar enterprises and we have to be concerned with that keeps them going or we will be forever rescuing them.

Another hidden hypothesis is that research and development are identical activities. As a matter of fact there is a section of the bill that ends up by defining research and development and says they are the same. That is a mistake.

In the armed services they have learned to distinguish these activities. There are very well established criteria for deciding when we are talking about research and when we are talking about development.

I think you ought to request, henceforth, that OMB report for all agencies that do R. & D. line items that will help you to separate "R" from "D." Otherwise you will have no protection against a bureaucrat who decides to read whatever clever law you pass and then do what he or she wants to do regardless of what you want done.

I served my time in this Government and I can tell you that none of us is smart enough to get ahead of what a determined, experienced civil servant decides to do. You must be explicit.

Now the objectives of this bill are to create jobs, to hasten the flow of new products, to rejuvenate our economy. It is really not to promote new and better research but constantly I see research confused with development, and that can cause a lot of trouble in many areas.

In the first place, typically a research and development budget when lumped together will be about 10 percent research and 90 percent development. It costs a lot of money to make a missile, or a tank, or an airplane, and it doesn't cost very much money to investigate the properties of rubber, or to investigate a new method of measurement, or an instrument.

If the 3 percent set-aside is taken out of the research budget, that will be a 30-percent reduction in funding available for research and that is serious. A 3-percent set-aside taken out of a development budget might not be so serious. Also, I think there is a lot of potential confusion, and I noticed just in the testimony this morning that you were as confused as I, about what happens to the money when it goes to a big company and it turns around and subcontracts to the little company.

One thing I know for sure happened. The little company doesn't get the patent rights it would get under the terms of reference that you have laid out for direct contracting. All you have to do as a small company—I am involved with small companies—is take a subcontract from a big company and see what their attorneys do to you as far as patent rights go. Just that one side of it, you see, says that, just looking at where the money goes and thinking it is the money that matters, only the money that matters, is going to mislead you in your main purpose.

Now I want to quote from an experience that is reported in a new magazine that has come out recently called "Technology." In volume 1, issue 1, page 21, it tells the story of a founding of a company now called Witec. It was founded by Raymond Wieck, a physicist. He started making precision ceramic castings while a research director at a California company. At the time when he was doing that, they made their precision ceramic products by casting and then grinding to get the final dimensions. He thought about this for awhile and came up with the idea of making extremely fine particles, much finer than anybody had used before, and using conventional casting equipment to produce castings that would not require grinding and therefore would be much cheaper to make.

His boss told him the company wasn't interested, but he could do it on his own time and money, and it took him 10 years. He finally figured it out, developing a very sophisticated system involving computer controls and all that. He showed what he had at an industrial exposition. Today his partner is Kobe Industries of Japan.

Now I can tell the same kind of story about many other products. In my job a lot of times inventors call me up, people who know me, and they come and talk about getting their business going. I can tell you case after case where people in small businesses have an idea and need $3, $5, $10 million to get going. When they go around knocking on doors to get it the Japanese are there right away with the money to help them. One of the things I would like to be sure that we do in this bill is not just simply fund a lot of new innovations, get them up to the point where they are ready to go to market and then we discover the partner is overseas and that is where the jobs are created. I think you should be concerned about that.

I want to talk a bit about the administration of this bill. Unfortunately in the rush to save money and pare down the size of the Government we have had a lot of people come in and swing the ax without necessarily knowing what they were swinging at.

I came to Washington in a similar time. I had been involved with the State technical services activity in New Hampshire. I had been involved with Herb Holloman, then Assistant Secretary of Commerce and the Commerce Technical Advisory Board and, quite frankly, the only reason I was willing to leave the sanity and sanctity of New Hampshire to come down here to Washington and the halls of the Department of Commerce is because I felt that that State Technical Services Act provided a basis for the rejuvenation of American enterprise, because in 1969 it was apparent to many of us that we were on the downturn.

Other people didn't know it but there were studies available in the Department of Commerce that pointed this out very clearly. It was clear where we were going. I arrived in Washington to discover that the then Bureau of the Budget canceled the program and Mr. Rooney, who didn't like it anyway, managed to make sure that it died. I was terribly disappointed in that.

I point all this out because there is no home now for the administration of this act. The obvious place to put it would have been in charge of the Assistant Secretary for Science and Technology in the Department of Commerce, but that office doesn't exist anymore. An obvious group that could give oversight and look at how the program is going is the Commerce Technical Advisory Board, but that is gone, too.

So what does this bill do? It establishes the program in a very bureaucratic way. I think it is not a very good way. I also would like to point out that one of the reasons that the Office of State Technical Services was killed is that nobody was doing evaluative work to find out what happened to the money and therefore when the program came up for review we didn't have a data base.

I hurriedly put such a study together for the OSTS and found that at the time it was killed the program was returning more money to the Treasury than it took out. Had that story been available, if we had understood it, the program might still be alive today and would be useful.

I want to emphasize very strongly to you the importance of getting feedback and finding out what you do with this money and not just throw it at the problem. The administration of this bill is based on another hidden hypothesis; namely that the way the NSF has done its business is the way everybody ought to do their business. The bill sets up a very tedious and bureaucratic procedure naming two or three agencies that have to get together and agree with the mission agencies on how they are going to conduct their business and get everything in lock step in getting their contracts and proposals out.

Having been on the receiving end of legislation and trying to work with coordination, I can't imagine a greater invitation to waste and inefficiency than that kind of coordination, and for what? To carry out a program that we don't yet understand. That doesn't make sense to me. What I suggest you do is allow the agencies to conduct their business in the normal way, 96 percent of the funding is going to come from six agencies. So it isn't going to be much trouble for you to hear reports from the six agencies. DOD, which is the largest one, has already said it has a program for doing this anyway. I think you could work more easily with each agency to decide how it is going to act under this bill, and then look at what they did and decide on that basis what you want to do in the next year and the next year.

Then this proposal to start with, say, 1 percent, would make sense, and you could go up to 2 or 3 or 4 percent or whatever made sense as you went along, as you knew what you were doing, as they learned what they were doing.

You see a fellow or woman comes in to head a project desk at the NSF has no particular mission other than to see the money is given away, the projects are reviewed, and it is all done correctly. A person who is at a desk in a mission agency knows what he wants to do, is looking for people to do it. The proper way doesn't need review committees for innovation and for development of products. I think a peer review for research makes sense. A peer review for development, particularly on innovative development, never makes sense.

Who is going to do the reviewing, a competitor? People who don't know anything about it? A proposal to develop a product for a market implies the proposer knows something about the needs, the cost of doing it, what the critical problems are. As you go into an innovation you may discover halfway into it that what you thought was a problem isn't and what you thought was a cinch is a problem.

The direction and management of that kind of enterprise is not at all like what people come to NSF for. I can understand NSF making some lucky breaks. You have to expect in a business like this that for every 10 properties you support out only 1 or 2 are going to make it, if you are lucky. I can understand that they will have some success. It is a lottery. But results are not guaranteed. I don't believe that the peer review belongs in a development activity. But if you have lumped research and development together, and in fact many people here talk as though they are one thing, you shall be hopelessly confused by the data you get.

We recommend that you allow the agencies to run their business as they do and instead ask the GAO to make a study each year—not every other year—and to answer some very specific questions. I have listed them in the written testimony. I think it is important to talk about them now.

For each project that was funded: How many jobs were created? Was it primarily domestic sales, or were they foreign sales? What was the source of the additional funds? What about the tax consequences? Did any existing industry suffer? What does the contractor think of the process under which he or she and the organization are required to work? As a result of that kind of information, you can have hearings and you can improve the legislation in the coming year.

For each agency: What happened to unsolicited proposals? From what accounts do the set-asides come? What were the costs of administering this program? Do the businesses that lost in the competition think that the competition was fair? Did they get a fair shake?

Now to compare the agencies: Were some methods superior to others? Do the methods of notification work? In the aggregate are the intentions of the Congress being met?

If the GAO, which can hire agencies outside to do the studies, were to present you at the end of the program with studies like this, you would have a better basis with which to go forward. Now you are betting that the way the NSF does its business is appropriate for a mission agency, and you probably will run into many difficulties because it may not be and if it is wrong, you aren't going to have any basis for knowing what to do next time.

Mr. Chairman, I have some other things to say but I know we are pressed for time so I will stop here in case someone wishes to ask a question. Thank you.

[The prepared statement of Mr. Tribus follows:]

STATEMENT OF DR. MYRON TRIBUS, DIRECTOR, CENTER FOR ADVANCED ENGINEERING STUDY, M.I.T.

Mr. Chairman: Thank you for inviting me to testify on House Resolution 4326. In preparing to testify, I consulted with my colleague, Dr. J. Herbert Hollomon, Director of the Center for Policy Alternatives, at MIT. Herb is well known to this committee. What I have to say today represents our combined views.

While we support H.R.4326 and its companion bill, S.881, we believe that there are several things in them which ought to be changed. As they stand now, they only throw money at the problem. This will not suffice. Money is important. But it is not the only consideration in advancing America's innovative capabilities.. Recall that Gulliver was held down by ropes, not money.

The era of industrial competition into which the world is moving will be quite different from anything we have seen in the past. Our principal industrial competitor, Japan, understands this very well. Let me just quote from the table of contents of a report issued by MITI in March 1980, under the title, "The Vision of MITI Policies in 1980's":

The 1980s-The World's Turning Point
New National Goals
Milestones in Economic Management
External Policies in the Age of Interdependence
Overcoming Energy Problems and Preparing
   for the New Age
Towards a Technology-based Nation
Improving the Quality of Life
New Development in Regional Societies
Development of a Creative Industrial Structure
The Age of Vitalized Human Potential

Quoting from the MITI report: "Today Japan accounts for 10% of GNP of the world, even though Japan has only 3% of the world's population and 0.3% of the world's land. Its per capita national income has reached 90% of that of the United States." 89% of its energy resources are imported.

Compared with preparations by the Japanese are making, this bill is a feeble shot at the start of a protracted confrontation with the future. If we are serious about revitalizing our industry and increasing our capacity to innovate, to deploy technology in support of our objectives, we must get over the notion that we can achieve our aims by purely fiscal means. We need also to understand the infrastructure which supports technology. We need to be concerned with:

Training
Education
New ways for Industry, Government,
   and Labor to cooperate
Capital supply
Human Resource Development
Procurement Policy
Managerial Philosophies

Our comments fall in 4 categories:

1. The hypothesis behind the bill
2. The objectives of the bill
3. The proposed administration of the Act
4. The evaluation of the results of the Act.

The Hypotheses Behind the Bill

The bill contains one explicit hypothesis and several unstated ones. The explicit hypothesis is that small businesses are more efficient at creating new jobs and introducing new products and services. A study of the decision making processes of large and small firms provides good reasons to expect this result. The statistical evidence, especially that gathered by my colleague at MIT, David Birch, also supports this hypothesis. And I can say, from my own experience with American industry, that the hypothesis is sound when applied to most American companies.

But there is a danger in concluding that because the hypothesis describes the bulk of US enterprises, it applies to all places and times. There are important exceptions, such as the 3M Company in Saint Paul, the Control Data Corporation in Minneapolis or the Lord Corporation in Erie. They are by no means small, but they have impressive records. Then there is Sony in Japan and the whole Japanese photographic industry. Siemens in Europe is another counter example. Does the Congress intend to write off our large industries? We hope not. The Nation cannot have a trillion dollar economy composed of only businesses of less than 100 million dollars. It must also have some billion dollar enterprises. I commend the book "The Art of Japanese Management" for a comparison of American and Japanese behaviour in large organizations. We cannot forever be in the position of having to rescue them.

The MITI report, to which I referred earlier, shows that the Japanese are also looking at ways to harness the creative capabilities of their small enterprises. And you can bet they will be studying what we do and profiting from our mistakes.

We realize that this bill is only concerned with redirecting 3% of the R&D budget. But this seems like a good place to point out that there are equally big, if not bigger stakes in boosting the creative capabilities of large companies and ther Congress should take an interest in the other 97%.

The problem with our big industries lies in the way they are managed. "Overmanaged and Underled" is the way my good friend, Don Alstadt, CEO of the Lord Corporation describes it. We need an entirely new philosophy of management for our major corporations. Bill Norris, CEO of Control Data and I have written about the new managerial philosophy for ENTERPRISE, the Journal of the National Association of Manufacturers. (Copy herewith) The same views are held by Dr. W.

Edwards Deming, the man whom the Japanese revere for having revolutionized their approach to management. He tells me that he still has a very difficult time getting his ideas adopted in this country. The places which have adopted his approach, such as the Nashua Corporation, have demonstrated that his methods work as well in America as they do in Japan. But they require a renunciation of many practices of American managers, including some ideas taught in our schools of management.

An unstated hypothesis is that the NSF method of contracting is completely satisfactory and requires no improvement. We do not believe it is appropriate to the mission agencies. For one thing, the project officers of the NSF are selected and assigned to promote the capabilities of our scientific establishment. They do not come to the NSF with a mission. On the other hand, the project officer in a mission agency has a task to perform and is seeking contractors to help get the job done. Their situations are very different. We shall return to this issue when we discuss the administration of the Act.

Another hypothesis is that "research" and "development" describe essentially the same kinds of activities. Indeed, in Section 4 of H.R.4326 we find the following proposed addition to Section 9 of the Small Business Act:

> "(4)The term 'research' or 'research and development' means any activity which is (a) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied, (B) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or (C) a systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements"

This confusion of definitions, which the Congress now wants to write into law, will make it possible for clever bureaucrats to meet the letter of the law while thwarting the intent of the Congress. It is the basis for the apprehension of many Universities. "Research", the search for new knowledge and understanding is different from "Development", which is concerned with the creation of new devices, techniques, new processes and systems. It is true that we often commission research in support of a development and that researchers often find it necessary to develop new instruments and techniques. But, as Jeremy Stone, of the Federation of American Scientists has written (Congressional Record, Dec. 7, 1981 S14607) small businesses should be expected to contribute in "development", not "research". But by considering these two activities as though they were one, the Congress creates at best uneasiness in the Academic community and at worst can cause the "set asides" to come from already strained resources. We would expect an "R&D" budget to specify about 10% "R" and 90% "D". If the 3% "set aside" is to come from the "R" and not the "D", it will mean a decrease of 30% in the funding for the

Universities. This is not what the Congress seems to intend but as long as the line item in the budget is labeled "R&D", this confusion is bound to continue. And no matter how cleverly the Congress writes the law, the bureaucrat who wants to frustrate the intentions of the Congress will be able to do so legally.

We urge the Congress to direct the OMB to report "R" and "D" separately and not treat them as one line item in the budget.

The Objectives of the Bill

We cannot imagine anyone quarreling with the stated objectives of the bill: To create more jobs, to strengthen the economy, to increase international competitiveness.

The objective is not to increase the amount of basic research done in the nation. Nor is it to siphon funds from basic research into development. The intention is to divert money from organizations which are less likely to create new jobs into organizations which are more likely to do so. But things are never that simple.

The magazine, "Technology", in its first issue (pg 21) tells how a company called Witec was founded by Raymond Wieck, Jr., a physicist. He started making precision ceramic castings while a research director at Trivex, a California company which makes ceramic products by casting and grinding. The management was disinterested in pursuing his ideas so Wieck went ahead on his own time and money. After 10 years he learned how to combine new materials technologies with computer controls and produced ceramic castings of greater precision than had previously been possible. Within two weeks after his work was publicly known, Kobe Industries of Japan was knocking on his door. Today Witec is a joint venture with Kobe Steel Industries, Ltd., of Japan.

Witec is not an isolated example. Why are American companies less aggressive?

The objectives of the bill will not be easy to achieve. There are many pitfalls.

Administration of the Act

As Assistant Secretary of Commerce, Herb Hollomon initiated the State Technical Services Act. This Act provided for cost sharing in the establishment of an Office of State Technical Services (OSTS) in each of the states and territories. I was so impressed with the potential of the State Technical Services Act that I volunteered to become an advisor to the Governor of New Hampshire in administering his OSTS. It was my interest in this Act that caused me to forsake the serenity and sanity of the New Hampshire hills and accept a post in the Department of Commerce in 1969. You can well imagine my dismay when I discovered, on my arrival, that the Agency had been killed by overzealous and uninformed personnel in the Office of Management and Budget (the Bureau of the Budget in those days). At the time it was axed budgetarily, the Act returned to the treasury more money than it took out! This was not enough to counterbalance the pique of one Congressman who didn't like the whole idea because someone told him it hurt the building trades industry.

Now I find that this administration has not only killed any idea of a revival of the OSTS, it has even destroyed the office of the Assistant Secretary of Commerce for Science and Technology. I will pass over the question of whether the Administration has violated the law in this matter. In view of the outline of the MITI report I read earlier, it is violating common sense. That office would have been the natural home for the administration of this act. The way the Act is now written, Administration means only financial administration. The concern is only to see that the money gets spent and is not taken from the wrong accounts. This is not management...it is merely fiscal accounting. It isn't good administration. And it certainly isn't leadership. How to cure this deficiency is not at all clear. Given the status of the President's Science Advisor, who is now an advisor to the advisor to the President, it is idle to expect leadership across federal agencies, such as DoD and NASA from his office. It will not have the time to do more than see that the letter of the law is obeyed. The matter is too important to be left to drift. We urge the Congress to press the Administration for a more aggressive posture in this whole arena. Laissez faire will not suffice in the new era of international competition. The Government has an important role to play and must be in a position to cooperate with industry, labor and academia in reviewing our anti-trust laws, our labor-management practices, and the history of adversarial relations between business and government can be overcome. Where in the Government is this to be done?

The MITI policy for the '80s is based upon the advice of an "Industrial Structure Council", an advisory organ to discuss and deliberate on the direction of MITI policies. The council is composed of representatives of academic and industrial circles, consumers, and labor unions. The only comparable organization in this country was the Commerce Technical Advisory Board, another Hollomon creation, which has been banished along with the Office of the Assistant Secretary of Commerce for Science and Technology. If you do not do something about that, you should be ashamed of yourselves.

The Congress seems to believe that the way the NSF has contracted with small businesses represents the best way to do so. The bill calls for the Small Business Adminstration, the Federal Office of Procurement, the Office of Science and Technoolgy Policy and the OMB to agree upon a uniform method for procuring and administering contracts. We believe this is a mistake. For example, "peer review" makes sense for basic research, but it may not be appropriate for developmental engineering. Who are to be the peers? Competitors? Employees in the same firm? People who do not know the business? Peer review makes sense if the objective is publication of the results. It does not make sense if the objective is the marketplace.

As I said earlier, the project officer in a mission agency is in a different position from the project officer in the NSF. It seems to me altogether appropriate for the Congress to insist that more money go to the smaller companies, but it is not a good idea for the Congress to insist that the way each agency deals with its vendors should be precisely the same. The way we approach the design of an artificial heart is quite different from the way we approach the design of a new alloy.

The purpose of the act is to overcome the bureacratic practices, protocols and principles which hamper our larger enterprises. But in the Act the Congress seems intent on fastening similar practices on the project engineers in the agencies!

I am reminded of what the great Soviet airplane designer, Tupolev, once told a friend of mine. He said, "We shall beat you and for one good reason. We have had our red tape for 50 years and you are just beginning"!

Jack Rabinow, who is one of the most creative and innovative men I know, and who, I believe, holds more patents than any other living American, once commented to me on how constraints upon project officers have decreased the inventiveness of the U.S. Government in his life time. In the early days the project officers could discuss with different people what they wanted to do, select people capable of doing it and give them a contract. Now they are so bogged down in red tape, in the requirement to have reviews, to get three bidders for everything, that they have to skirt the edge of the law to get anything done.

We plead with you to remove all these attempts to guarantee that every agency does everything the same way and instead strengthen the probability of achieving the purposes of the act by adopting the evaluation procedures we propose next.

Evaluation

To begin with, it is well to keep in mind that we are moving into uncharted waters and that we have much to learn. We should not approach the Act as though we really knew what we are doing. My previous remarks called for diversity of approach and urged the Congress to let each agency determine for itself how best to achieve the results called for in the Bill. To take advantage of this diversity, the Congress should instead call for a comprehensive and extensive evaluation of the results and procedures of the Act. This will lay a better basis for improving it in the future. Through a competent evaluation we can begin to understand what costs have been incurred, what benefits have accrued (and to whom) and what needs to be done to strengthen the program.

Fruthermore, unless there is a good evaluation that relates results to expenses, the program will be vulnerable to uninformed budget cutters in the next change of aAdministrations. We note that S.881 calls for the GAO to report on the "quality, quantity, and nature of the basic research conducted under this Act, including the judgement of the departments and agencies involved as to the effect of this Act on their overall basic research programs". We urge that an annual evaluation be made by the GAO, and it should cover at least the following points:

For each project funded:
- How many jobs were created?
- Were domestic sales made?
- Were foreign sales made?
- What was the source of additional funds?
- What have been the tax consequences?
- Did any existing industries suffer?
- What does the contractor think of the process?

For each agency:
- How do unsolicited proposals fare?
- From what accounts did the "set asides" come?
- What were the costs of adminstration?
- Do businesses that lost in the competition think the competition was "fair"?

Comparing the agencies:
- Are some methods superior to others?
- Do the methods of notification work?
- In the aggregate, are the intentions of the Congress being met?
- Which techniques were best?
- What improvements might be made?

Since 6 of the agencies account for 94% of the funding that will occur under this bill, your committee could well let each of them contract in its normal way and instead interview the 6 agencies to see what can be learned from their experiences. And you can better apply pressure to them directly than via the complicated method called for in the bill, which calls for countless hours of coordination among 13 agencies to achieve a common way of handling procurment in vastly different organizations with different requirements.

Only through this kind of comprehensive evaluation can the Congress discover if it needs to make significant changes. For example, will we need "march in rights" if we find that a company goes through phases A and B and then joins with a Japanese company to put the idea into production in Japan? And what are we to do if only the Japanese are interested in carrying the product to market??

Conclusion

Despite the many criticisms we have given, we hope you will understand that we are in favor of the bill. But in the perspective of what needs to be done to meet the challenges of the future the bill falls woefully short. We are engaged in a new kind of economic competition. Indeed, some may even call it a kind of economic warfare. One after another of our industries has fallen to foreign competition. We not only do not have a strategy for dealing with the problem, we have no office of Federal Government in which such a strategy could be developed. We have an Administration which believes the solution is to be found by a combination of fiscal and tax policies and laissez faire. It believes free market mechanisms alone will solve our problems. It has abdicated the responsibility of Government to provide leadership. It seems to believe that the managers of our industries, many of whom are responsible for getting us into this mess, are going to pull us out.

But there is much more to be done. Much more. We need to learn innovative ways to rebuild our cities, to revitalize our transport systems, to invent new kinds of jails, to develop new educational systems and to revitalize our large industries. Our Government still does not believe or understand that we face extraordinary challenges and must adopt new ways or we shall go under.

We urge the committee to conduct hearings in which the leaders of our more creative large industries will speak about what they do. You should also hear from the leaders of steel and other industries which have such miserable records. And you should be prepared to ask them the embarrasing questions this administration shuns but which will reveal they do not know their jobs.

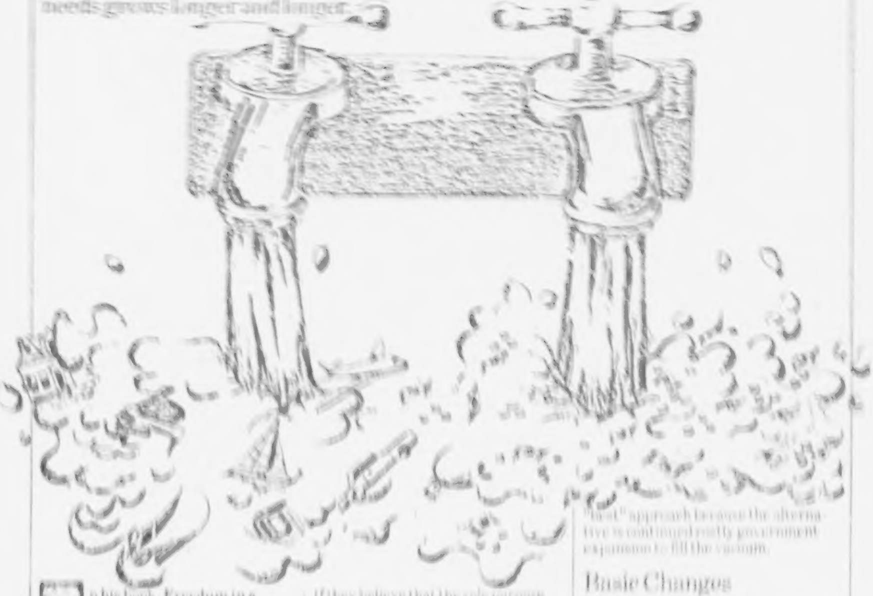
Harrison Salisbury once told this story:

> Once there was a fight in Madison Square Garden in which the fighters were unevenly matched and one of them took an awful beating. He finally went down and someone in the crowd shouted "Fake!". Soon everyone took up the cry, "Fake! Fake!" They even kept up the chant as the stretche bearers took the fighter from the ring. The next day the fighter died. Salisbury closed his story by saying: "You know, he had to die, just to prove the fight was on the level"
>
> I hope our major industries do not also have to die to prove this fight is on the level, too.
>
> Thank you.

BUSINESS AND THE OTHER SPIGOT

By William C. Norris and Myron Tribus

As a consequence of business' preoccupation with things that are least risky and most profitable in the short run, most of the critical needs of society are left as the responsibility of a government inadequately equipped to deal with them. The result: Government grows to disastrous proportions while the list of unmet needs grows longer and longer.



In his book, **Freedom in a Rocking Boat**, Sir Geoffrey Vickers describes private enterprise as having two spigots. From one spigot flow the goods and services needed by society; from the other spigot flow the tokens to purchase goods and services.

Whether the managements of our enterprises choose to try to meet the needs of society depends very much on how they regard the two spigots. If they believe that the sole purpose of the first spigot (which provides the goods and services) is to support the second spigot (which supplies the tokens), they are apt to back away from the list of needs and look for something more readily profitable.

We maintain that for the good of our society, approaching these social needs as business opportunities is the "best" approach because the alternative is continued costly government expansion to fill the vacuum.

Basic Changes

Changes are in order if the continued growth of government is to be checked. The changes that must be made are fundamental. They focus on the making of business decisions and on patterns for dealing with the unemployed, especially the young and disadvantaged.

One of the fundamental changes that should be made involves the criteria by which businesses decide to allocate resources. We are not

(continued)

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concerned here with routine decisions on day-to-day operations. Rather, we are concerned with how businesses react to, grasp and develop the new technologies and approaches required for solving our pressing social problems.

Therefore, we include in our concern not only how businesses react to new ideas about hardware and software, but also how they cope with the many barriers to doing things new ways—the educational, organizational and political barriers, and plain ordinary habits.

We believe that a good part of the problem stems from the education given to the young men and women attending our schools of business. The rise of "professional manager corps" has meant the development of cadres of middle managers not devoted to any particular social accomplishment but rather trained to look only at the second spigot.

One important barrier to the adoption of new technologies is to be found in the decision making rules and criteria that are taught to many business administration students in our universities and carried without question to the staffs of many corporations.

The 'ROI' Mentality

A frequent cause of aborted technology is the erroneous application of the Return on Investment (ROI) calculation. Investment decisions, looked at only in terms of the second three common human traits: greed (the desire to get as much for as little as possible), impatience (the desire to have something now, rather than later) and fear (the desire to avoid risk).

The irrational step occurs when decision makers try to incorporate their risk aversion (fear) in the decision making process by insisting that, if the proposed venture is risky, it should have a higher ROI. The misapplication of the ROI calculation can be devastating to decisions regarding innovations, for these are apt to be both long range and risky.

In the competition for funding, if the ROI calculation is used as the criterion, small incremental changes will always win out over longer-term risky ventures.

We are now witnessing the consequences of decisions made a decade ago. In our view, they represent a misapplication of the ROI mentality as regards development, deployment and exploitation of technology. Consider the following examples:

☐ Liquid crystal displays (LCDs) were invented in the United States and England. Today, 95 percent of all LCDs are sold by Japan. The failure to exploit them was not an R&D matter; it was a decision not to invest in the new technology.
☐ Videotape recorders were first developed in the United States. This year, more than half a billion dollars worth of videotape players are expected to be sold in the United States, none made here.
☐ New concepts for containerships, such as the Valmet Barge Handling system, originated here but are now sold by Finland.

The general press has provided many additional examples, with small automobiles near the head of the list.

But if the ROI calculation is improper, what is proper?

First, a company should try to understand what it wants to do, as described by the kinds of products and services it wishes to supply (the first spigot); how it expects to make a profit while doing so (second ably will be doing, and what will be happening in the marketplace.

Given its goal statement (the output of the first spigot), the management of the company can devise a plan for achieving its aim. It should take into account not only its desire for profit, (i.e., an ever-increasing flow from the second spigot), but also it should keep in mind that its entire business may be stolen altogether by people more interested in the long term than they are and who will develop new, more competitive technologies.

It is a perversion to insist that the sole purpose of a business is to produce a steady stream from the second spigot. To conceive a business as merely a money pump in society confuses means with ends and causes harm to the person, to the business and to society.

Managerial considerations in innovation take on added significance these days because we read about the many comparisons between business practices in Japan and the United States. Japanese managers are often pictured as building successfully on unique Japanese traditions to create cooperative, productive and innovative environments. Similar results have been obtained in this country using well known American practices. We believe it is important that people know about them. Everything reflects managerial attitudes—most of all, what managers think the purpose of business really is.

Inner City Siting

We are aware that there have been several spectacular failures in attempts to put new plants in inner cities. Control Data Corp. has successfully sited new plants in five depressed areas. Employment in the five plants will soon reach 1,500 persons. Placing these plants in inner cities did not involve innovations in hardware; it did require fresh thinking about how to approach the siting issue.

Although the plants are now profitable, and were always intended to be so, the decisions to locate a plant in a poverty area were not made on the basis of a return on investment calculation. If they had been, the project would never have survived.

Race riots during 1967 dramatically signaled the urgent need for more jobs in inner cities. Having been involved in mostly unsuccessful efforts to attract inner-city disadvantaged persons to accept and retain jobs in suburban plants, Control Data's management began with the idea that the barriers to success could be removed by placing hiring offices in inner-city communities.

The decision was greatly influenced by the rioting that occurred on the north side of Minneapolis, an unheard-of event in a city that has previously been free of the usual symptoms of racial strife. An ROI calculation surely would have suggested placing the plants elsewhere, perhaps even on foreign shores. But the image of the corporation as a source of jobs was the dominant one.

To begin with, it meant viewing the people as a resource to be developed, not a crop to be winnowed. Decisions of this sort must flow from the very highest levels of management. They cannot be initiated from below.

It soon became obvious that the hiring offices would have to include skills training. And, on further reflection, it became obvious, too, that it would make better sense to bring the jobs to the people than to train them in inner cities to commute to the suburbs. This thinking led to the idea of a combined installation — a Control Data Training Institute (CDI) — adjacent to a brand new manufacturing plant.

Remember No. 1

It would have been shortsighted to have thought about the installation only in terms of the company's needs (which is the way things usually go if management concentrates on the second spigot). The image of a corporation as having a responsibility to provide meaningful employment in a community carries with it a positive interaction with the community.

The traditional approach to siting a facility is to approach the city administration and see what bargains can be struck as to taxes, facilities and the like, especially between two eager and, if possible, competing cities. In 1967, in a black community, given the reputation of business, this would have been the wrong approach.

The only workable approach was to join with the leaders of the community to develop the plan for the plant and its operation and to locate it there only if they wanted it.

One example of this genuine sharing of power — and only genuine sharing will work — was the revision of hiring practices. After many discussions around a large table with many community leaders present, it was decided to throw out the usual four-page job application form and use a single one-page form requiring mostly check marks.

Recognizing the purpose as job creation at a profit and not profit creation with jobs, it was decided to have several different kinds of entry-level jobs and allow people to try different ones until they found the one they liked or found they didn't like any of them. In the end, this meant that they may reject the company, not vice versa. Exit interviews confirmed that separations were not hostile in most instances.

Another profitable idea came out of this sharing of responsibility. In line with the philosophy of not screening out people, it was proposed that the health screening test be dropped. The black leaders pointed out, however, that the community did not have adequate health care and these examinations could be meaningful. With their help, the health system was expanded to a counseling service, now available to 40,000 Control Data employees.

For Your EAR

The Employee Advisory Service (EAR) now maintains a toll-free number, so any employee or family member may call for advice on a variety of topics. The service covers health care, family problems (such as a death in the family) and legal problems (such as bail and other personal services). EAR also serves 30 other firms and has been the model for more than 100 other organizations. EAR, in serving other companies, is profitable.

Norris is chairman and CEO of Control Data Corp.

The normal criteria for success of the plant were applied. Indeed, interplant comparisons can be a source of pride and dedication. It works both ways; the rest of the corporation will judge the staying power of the corporate commitment by the second spigot. It is true that start-up costs were somewhat higher than for a normal plant. But these are no longer normal times and who is to put a dollar value on being part of, not apart from, the community? And what is the book value of a plant eligible to be torched?

The ROI calculation has been applied to the performance of the plant retroactively and the results are satisfactory. But the ROI and other discounting calculations were never applied as criteria for deciding whether or not to go forward. The commitment was made to the flow from the first spigot and creativity was applied to ensure the flow from the second.

There is no such thing as a risk-free future. There is no way to plan to avoid change. There is no way to change without risk. Either businesses will take a chance on meeting society's real needs or they will try to play it safe and we will all go down together. ■

This article is condensed from a longer paper, available without charge by writing to: The Other Spigot, HQN11Y, Control Data Corp., Box O, Minneapolis, Minn. 55440.

Mr. WALGREN. Mr. Chilton?

Mr. CHILTON. Thank you very much for asking me to come and testify this morning. I have submitted a lengthy statement, but I will give you a 10-minute summary this morning.

It is gratifying to see this expression of sincere concern on the part of Congress in promoting the economic contribution of smaller firms. I am interested in both small business and innovation personally, so it is again gratifying to be able to testify to you this morning.

Again, as Dr. Tribus has said, these are my opinions and not those of the Center for the Study of American Business.

I believe this bill is additional evidence that we have begun to enter a new era in the relationship of the Federal Government to the small business segment of our economy. While the 1970's might be characterized—at least I have characterized them—as the Dark Ages of public policy affecting small firms, a period of not so benign neglect and misdirected Government support, the 1980's may well produce a modest Age of Enlightenment.

As one observer of the public policy scene has remarked, "The Government is currently giving small business the kind of attention, if not money, once reserved for eradicating poverty and exploring outer space." With this positive observation as background I would like to present to you some of the strengths and weaknesses of H.R. 4326 as I see them.

First, the positive side. There is no need to reiterate the now well-known statistics that describe the important role of small firms in innovation in America. According to many studies of the sources of innovation, small firms have demonstrated what economists term a "comparative advantage" in this vital area of economic development.

If small firms are efficient with research dollars, why do they capture only a 3.5- to 4-percent share of the federally contracted R. & D. dollar? That is the question before us.

I will attempt to answer that question later in my testimony, but let's first examine how this bill creates a means for capitalizing on entrepreneurial efficiency. The ultimate aim of the bill, of course, is to achieve more bang for the Federal buck. The small business innovation research program is the heart of the bill. It is patterned after the 5-year old National Science Foundation SBIR program. The intent is to stimulate small business participation; originally, in this pilot program in the NSF research and, in general, to encourage commercial applications of that research.

Now, NSF has pointed to the fact that the $5.3 million that it has expended in this program in the 4 to 5 years of its existence has resulted in $23 million in private follow-on funding. These figures are modest but they are encouraging.

In particular, the three-phase approach of the NSF SBIR program is a sound one. Phase I is a research proposal and feasibility phase in which grants have a ceiling of $25,000. It produces a large pool of research proposals that are then winnowed down, in the second phase, to selected research projects worthy of more generous Federal support (averaging $200,000). The projects that have a potential for commercial application, particularly those that have received commitments for development funding from a private source, are favored for phase II Federal grants. A laudatory feature of this approach is the withdrawal of the Federal Government from the commercial development phase—the third phase. This is a wise differentiation of the proper roles for the public and private sectors.

Though the Small Business Innovation Development Act does not define the level of funding intended for the expanded program, the companion document furnished by the House Committee on Small Business suggests grants of $30,000 to $50,000 in phase I and grants of $100,000 to $500,000 in phase II. The SBIR program would effectively be expanded to include all agencies with research and development expenditures over $20 million annually, although specific set-aside provisions would apply only to those agencies having R. & D. budgets over $100 million.

In addition, the bill provides some valuable mechanisms for implementation of the SBIR program. It addresses the need to protect the taxpayer's money from frivolous expenditures by establishing peer review of the selection process for phase II grants and specifying overall program review by the Office of Science and Technology Policy. More importantly, the bill also requires an annual report that will be reviewed by the Committees on Small Business in the Senate and House of Representatives. Safeguards and oversight of the program are, therefore, not lacking.

Unfortunately, one of the features of the current bill—the set-aside provisions contained in section 4 subsection 9 (f) and (h)—seem unnecessary and unwise. This requirement that the 12 agencies with R. & D. budgets exceeding $100 million set-aside up to 3 percent of those research expenditures for the SBIR program is very popular within the small business community, however.

I also believe Abraham Lincoln was correct when he said "a universal feeling whether well or ill-founded cannot be safely disregarded." Since I do not have to face re-election, however, it is somewhat safer and easier for me to say Congress should disregard this widely held feeling that favors a small business set-aside. Frankly, I do not believe this is the best way to correct for the perceived underutilization of small firms in Federal research programs.

First of all, such a segmentation of the supply side of research contractors is likely to have a detrimental effect on the normal market for Federal research—that is, it interferes with the normal efficiency of the marketplace. Our Center for the Study of American Business in St Louis has been unswerving in its pursuit of regulatory reforms that make use of markets.

Further, we have been critical of most command-and-control approaches to changing private behavior. It would be at best inconsistent of me to now promote a potentially inefficient allocation of taxpayer dollars by supporting command-and-control regulation of public decisionmakers.

Certainly, we must recognize that there are times when the marketplace cannot produce a desired social behavior on the part of private parties. In those instances, I support the least obtrusive use of Government power to bring about the desired result. But the cause should be very compelling and the benefits large in comparison to the costs.

Analogously, the actions of bureaucrats do not always produce the best results for society. In these instances, the imposition of controls over bureaucratic behavior should also be as unobtrusive as possible. Frankly, I do not find the case for a small business set-aside compelling enough to warrant establishing this precedent in research funding.

More objectively, however, I believe that the set-aside provisions solve only one of several possible causes of the problem of underutilization of small business in Federal research. I see some of these possible explanations as the following:

One. Big Government agencies prefer to contract with big business and big universities in order to: (a) simplify the process of contracting for and monitoring research projects, and (b) minimize the second-guessing of funding decisions.

Two. Government contracting agents are ignorant of qualified small business contractors.

Three. Qualified small businesses are unaware of Federal research opportunities.

Four. Small firms are intimidated by Federal redtape and, thus, do not seek Government contracts.

Five. Small firms are not adequately financed to withstand bureaucratic delays in decisionmaking or payments.

Six. Some agencies discriminate against all profitmaking firms. (To many agencies in the Department of Health and Human Services profit is a dirty word.)

Seven. In some instances, small firms simply are not qualified to conduct a particular project because of its large scale nature. (In these situations small firms should still be involved as second tier subcontractors.)

Set-asides address only the first cause. Furthermore, they are not likely to produce major incremental benefits beyond those that can be obtained by simply demonstrating congressional concern through the establishment of SBIR programs. Moreover, congressional review of the progress of these programs, as established in H.R. 4326, should provide a continuing incentive to bureaucrats to utilize the small business sector.

RECOMMENDATIONS

In addition to the bill being considered by this committee, other opportunities will soon arise for Congress to address some of the special problems of small research firms in obtaining Federal grants. For instance, the Delinquent Payments Act (S. 1131) or its House of Representatives counterpart, the Prompt Payments Act (H.R. 4709) would help alleviate late payment problems (point No. 5 above).

It seems to me that it would also behoove the Small Business Administration, with the assistance of the Office of Science and Technology Policy, to expand and make better use of the procurement automated service system [PASS] to match up qualified small firms to agency research needs (points Nos. 2 and 3 above). The Small Business Administration should exert a concentrated effort to see that small, high-technology firms are in this system's data base. Merely printing requests for proposals in Commerce Business Daily is insufficient. This seems to me to be a productive use of SBA and OSTP resources.

In conclusion, while the intent of the Small Business Innovation Development Act is laudable, the set-aside provisions of the bill are unlikely to produce large incremental benefits over and above those created by a congressional mandate for SBIR programs without specific funding quotas. I believe this will send the right signals to Federal agencies to encourage progress in making use of small firms in research programs. It also demonstrates continuing congressional concern with the vitality of small business. More importantly, I believe it will produce economic benefits that will far exceed the Federal funds that are expended in the SBIR programs.

In the long run, however, the best way to encourage small firms to innovate is not by designing special programs or earmarking special funds for small business but rather by removing barriers to competition. In this regard, the tax reform and regulatory reform measures recently enacted will do more to facilitate innovation—by small and large firms alike—than will the targeted approach embodied in the Small Business Innovation Development Act.

In the final analysis, small firms do not need more direct Government help; they merely need to be given a fair opportunity to do what they do best—produce new goods and services.

[The prepared statement of Mr. Chilton follows:]

INCENTIVES FOR INNOVATION:
FEDERAL RESEARCH AND SMALL FIRMS

By Kenneth W. Chilton

Testimony on the Small Business Innovation Development Act of 1981
(H.R.4326) before the Committee on Science and Technology,
U.S. House of Representatives, Washington, D.C.
January 27, 1982

It is a great pleasure to be asked to testify on the Small Business Innovation Development Act. It is gratifying to see this expression of sincere interest on the part of Congress in promoting the economic contribution of smaller firms. Furthermore, I believe this bill is additional evidence that we have begun to enter a new era in the relationship of the federal government to this important segment of the economy. While the 1970s might be characterized as the "Dark Ages" of public policy affecting small firms -- a period of not-so-benign neglect and misdirected government support -- the 1980s may well produce a modest "Age of Enlightenment."

There is no need to reiterate the now well-known statistics that describe the important role played by small firms in innovation in America. According to many studies of the sources of innovation, small, entrepreneural firms have demonstrated what economists term a "comparative advantage" in this vital area of economic development.[1] If small firms are more efficient with research dollars than larger firms, why do they capture only a 3.5 to 4 percent share of the contracted federal R & D dollar?

Mr. Chilton is the Associate Director of the Center for the Study of American Business at Washington University in St. Louis. The views expressed are personal.

Before I attempt to answer this question or evaluate the ability of the Small Business Innovation Development Act to provide incentives for small firm innovation, I would like to examine some of the past public policy disincentives to these firms. I would also like to acknowledge some of the positive policy initiatives that have been made or are being made to strengthen small business in the 1980s.

FEDERAL POLICIES IN THE 1970S

In particular, three major areas of federal policy conspired to diminish the contributions made by small firms in the decade of the 1970s. Two of these, federal regulation and tax policy, were characterized by a lack of concern for their impact on small firms -- a case of "not-so-benign neglect." The third area, that of direct government support via Small Business Administration loans, was ineffective at best. This period also marked a decline in the role of smaller firms in the field of innovation -- from the chief source to a position secondary to large corporations. Surely the inhospitable public policy environment faced by small firms in the 1970s should not be overlooked as a major contributor to this decline. Furthermore, it is worthwhile reviewing some of the specific difficulties created by past policies simply because, as George Santayana has said, "Those who do not remember the past are condemned to relive it."

Regulation

Without doubt, one of the most fundamental changes in the roles played by the public and private sectors in America took place in the past decade. The rapid growth of federal regulation of business activities during the 1970s was unparalleled in our nation's history. The decade of the 1970s witnessed the enactment of 130 major federal acts that increased government control over business firms. The "New Deal" decade of the 1930s, often viewed as the most interventionist decade in American history, is the epitome of laissez-faire by comparison, with only 42 major statutes enacted.[2] The regulatory phenomenon grew so rapidly and became such a pervasive influence on business decision making in the 1970s that a rule set in Washington by the "shadow management team" of regulators could have a more profound effect on profits than the decisions made by a firm's own executives.

Regulatory Effects on Small Business Innovation

Far from being immune from the rapid expansion of federal controls, small firms often experienced disproportionately adverse effects. Several examples of how these controls affected small-firm innovation are illustrative of the whole.

Perhaps the best documented example of the adverse effect of regulation on technological progress is furnished by pharmaceutical regulation. The 1962 amendments to the Food and Drug Act are estimated to be causing a four-year delay in the introduction of effective new drugs. In addition, the R & D cost for a new drug has increased from $10 million to $54 million (in constant 1976 dollars) since passage of the 1962 amendments. As a result, innovation has become increasingly concentrated in the large, multi-national drug companies. Apparently, these firms are better able to bear the additional costs and risks of innovation than smaller firms and, in addition, they can shift resources on a worldwide basis -- thus alleviating some of the burdens of FDA regulation.[3]

Another example of regulatory barriers to small-firm innovation is furnished by the proposed regulations on radiology equipment promulgated by an office within the Food and Drug Administration known as the Bureau of Medical

Devices and Diagnostic Products. Dr. William Tuddenham describes the likely impact of these regulations as follows:

> These controls effectively impede the development of experimental devices and equipment, even of a trivial sort, and by virtue of the "Regulations Establishing Good Manufacturing Practices" they essentially "freeze out" the small manufacturer of specialty products.[4]

Moreover, the premarket approval prodcedures to be promulgated under the Toxic Substances Control Act of 1976 may make new product development extremely costly for small firms in the chemical industry. The consulting firm of Foster D. Snell, Inc., prepared a study of the potential impacts of TSCA on the chemical industry. This report forecasts the following results for small firms for extensive testing of new substances:

> 1) Small firms would need to triple innovation expenditures to maintain their present rate of new product introductions. The cost pass-through would effectively price the small firms out of business.
>
> 2) At current levels of R & D expenditures, the small-firm new product introductions would decline 80 to 90%, which would also, in effect, put many of them out of business.[5]

Thus, there is concern that TSCA regulations may produce government-induced economies of scale for product development in the chemical industry, resulting in less small-firm innovation.

To be sure, the motivation behind the rush to regulate in the 1970s was understandable. But far too many of the regulatory thrusts of that decade failed to adequately consider the costs and many harmful side effects for small business.

Taxes

Tax policy in the 1970s also largely ignored the special problems faced by small firms. Many of the provisions of the tax code resulted in effective tax rates that were regressive with respect to firm size. For instance, in 1979, firms with assets of less than $5 million had an effective tax rate of 41 percent on average, while firms with assets over $1 billion paid at an average 29 percent rate.[6]

Ineffective Intervention

Even in cases where the federal government took action to address the problems peculiar to smaller firms, such as Small Business Administration (SBA) aid programs, the results were negligible, if not negative.

A recent review of more than 14,000 SBA loans by two reporters for the *St. Louis Globe-Democrat* produced shocking news. More than 40 percent of the direct loans end in defaults, and only 18 cents of each dollar loaned is collected on these defaults. The report estimated that more than $571 million was lost in the program from 1970 to 1978.[7]

Possibly the most disappointing SBA program of all, however, is the Section 8(a) Procurement Program. This program was designed to develop and nurture small, minority-owned firms by distributing non-competitive contracts to them. Since its inception in 1969, the program has covered 4,600 firms, awarding more than 27,000 contracts worth $5.5 billion.[8]

Yet more than 30 percent ($1.7 billion) of the 8(a) administered contracts have gone to only 50 active small firms, and three fifths of these firms have been on the 8(a) program for over seven years. Ironically, an SBA district supervisor reported that many of these firms are so swamped by government contracts that they cannot find time to establish outside commercial business -- thus preventing them from becoming self-sufficient.[9] Only 4 percent of the firms admitted to the program over its twelve years have "graduated" to become self-sufficient entities.[10] Thus, both the Section 8(a) program and the direct loan program demonstrate that worthy objectives are not sufficient to ensure effective use of taxpayer monies.

PROSPECTS FOR THE 1980s

Fortunately, public policymakers in the present Administration and Congress are currently -- and will likely continue to be -- much more aware of the contributions and needs of small business.

Regulatory Relief

Regulatory reform benefiting small business began to be passed in 1980. One of the most important changes was the Regulatory Flexibility Act, which requires federal agencies to tailor regulatory requirements to the size of the firm, where possible. Several other acts passed in 1980 will provide important benefits to small business. First, the Paperwork Reduction Act should help entrepreneurs, since filling out government forms most often falls directly on the shoulders of the busy small business owner. And second, the Equal Access to Justice Act, passed in 1980, enables small firms to recover costs incurred in specific types of legal actions involving the federal government.

Furthermore, small firms will benefit in a very general way from the regulatory restraint produced by the President's Executive Order No. 12291, which requires review of all new regulations by the Office of Management and Budget. Omnibus reform bills, such as S.881 and H.R.746, also promise to expand the scope of this restraint. Taken as a whole, these initiatives represent a significant departure from the attitude of "benign neglect" that prevailed in Congress and the Executive Branch toward small business in the 1970s.

Tax Incentives

Tax policy affecting small firms also began to change in the late 1970s. The 1978 capital gains tax reduction (under the Revenue Act of 1978) lowered the maximum capital gains tax rate from 35 percent to 28 percent. This change increased the flow of capital to small firms by enhancing the return to individual investors.* It also brought about a renewed interest in the stocks of growth companies.

Several tax reforms embodied in the Economic Recovery Tax Act of 1981 are of particular interest to small firms. In general, these firms should benefit from provisions that: 1) reduce the top tax rate on investment income from 70 percent to 50 percent; 2) reduce the tax rates for the lower levels of business profits; 3) increase estate tax exemptions from $175,000 up to $600,000 over a six-year period; 4) simplify and liberalize depreciation methods (the Accelerated Cost Recovery System); 5) increase from $150,000 to $250,000 the exemption to the accumulated earnings tax; 6) increase the number of shareholders in a Subchapter S corporation from 15 to 25; and 7) give across-the-board tax cuts to individuals. While a sluggish economy may mask some of these benefits for a time, they should contribute significantly to the economic well-being of small business in the longer run.

Recent Policy Inducements for Small Business R & D

In addition to these public policy changes that are providing broad benefits to small business, several specific inducements for small-firm R & D that have recently been enacted are noteworthy. For instance the University and Small Business Patent Procedures Act made it possible for both small businesses and universities to obtain patent rights to products invented under federal research funding. This change increases the incentives for firms to cooperate in federal research and enhances the likelihood of private financial support for this research. It should also increase the return to the taxpayer, since patents that gross more than $70,000 in sales will contribute between 15 percent to 5 percent royalties to the Treasury.[11]

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*In some instances, the "maximum" rate prior to 1978 could exceed 49 percent if the individual investor had preferential exclusions exceeding 50 percent of his tax liability or $10,000, whichever was greater.

The incentives for private-sector research contained in the Economic Recovery Tax Act are another good example of helpful indirect encouragements to innovation. While firms of all sizes will benefit from the 25 percent tax credit for incremental research expenditures, the Act contains some special provisions to assist "start-up" firms. Tax credits may be carried forward ten years -- a very helpful change, since few new firms will realize any of their profits in their early years of operation. Furthermore, rather than using a normal base period of three years, the base used by a start-up company is set at zero, and all research expenditures in the first year consequently earn the 25 percent credit. In the second year, the base is calculated as one third of the first year's R & D expense, thus resulting in another generous tax credit. This type of consideration for the peculiar problems faced by small business in making use of tax incentives is what was missing in public policy of the past decade.

THE POSITIVE PROVISIONS OF H.R. 4326

How does the Small Business Innovation Development Act continue this new tradition of positive public policy toward small business? As the purposes of the Act state, the goals are to: 1) stimulate technological innovation 2) use small businesses to meet Federal R & D need and 3) increase private-sector commericialization of innovations derived from Federal R & D. These goals are predicated, of course, on the "comparative advantage" of small firms in conceiving of and developing new products, as mentioned earlier in these remarks.

The Act seeks to build upon the "Small Business Innovation Research Program" (SBIR) initiated within the National Science Foundation in 1977 at the direction of Congress. Success stories emanating from this program include development of laser optics for use in large-scale information storage equipment, commercial funding of genetics research for enhancement of animal protein production, and development of an instrument to measure the metal fracture toughness of drill bits. As a further measure of success, NSF points to the fact that the $5.3 million it expended in this program between 1977 and October 1981 has resulted in 23 million in private follow-on funding[12].

In particular, the three-phase approach of the National Science Foundation SBIR program is a sound one. Phase I is a research-proposal and feasibility phase in which grants have a ceiling of $25,000. It produces a large pool of research proposals that are then winnowed down, in the second phase, to selected research projects worthy of more generous federal support (averaging $200,000). The projects that have a potential for commercial application, particularly those that have received commitments for development funding from a private source, are favored for Phase II federal grants.[13] A laudatory feature of this approach is the withdrawal of the federal government from the commercial development phase -- the third phase. This is a wise differentiation of the proper roles for the public and private sectors.

Though the Small Business Innovation Development Act does not define the level of funding intended for the expanded program, the companion document furnished by the House Committee on Small Business suggests grants of

$30,000-$50,000 in Phase I and grants of $100,000-$500,000 in Phase II. The SBIR program would effectively be expanded to include all agencies with research and development expenditures over $20 million annually, although specific "set aside" provisions would apply only to those agencies having R & D budgets over $100 million.

In addition, the bill provides some valuable mechanisms for implementation of the SBIR program. It addresses the need to protect the taxpayer's money from frivolous expenditures by establishing peer review of the selection process for Phase II grants and specifying overall program review by the Office of Science and Technology Policy. More importantly, the bill also requires an annual report that will be reviewed by the Committees on Small Business in the Senate and House of Representatives. Safeguards and oversight of the program are, therefore, not lacking.

THE SET-ASIDE STUMBLING BLOCK

Unfortunately, one of the features of the current bill -- the set-aside provisions contained in SEC.4 Section 9 (f) and (h) -- seem unnecessary and unwise. The requirement that the twelve agencies with R & D budgets exceeding $100 million set aside up to three percent of those research expenditures for the SBIR program is very popular within the small business community, however. This special pool could provide as much as $1.2 billion in grants, based on 1982 research levels.[14] Furthermore, these grants would involve expenditures over and above the current 3.5 to 4 percent share of federal research being contracted with small firms. Frankly, I do not believe this is the best way to correct for the perceived underutilization of small firms in federal research programs.

First of all, such a segmentation of the "supply side" of research contractors is likely to have a detrimental effect on the normal market for federal research -- that is, it interferes with the normal efficiency of the market place. Our Center for the Study of American Business has been unswerving in its pursuit of regulatory reforms that make use of markets. Further, we have been critical of most command-and-control approaches to changing private behavior. It would be at best inconsistent of me to now promote a potentially inefficient allocation of taxpayer dollars by supporting command-and-control regulation of *public* decision makers.

Certainly, we must recognize that there are times when the marketplace cannot produce a desired social behavior by private parties. In those instances, I support the least obtrusive use of government power to bring about the desired result. But the cause should be very compelling and the benefits large in comparison to the costs.

Analogously, the actions of bureaucrats do not always produce the best results for society. In these instances, the imposition of controls over bureaucratic behavior should also be as unobstrusive as possible. Frankly, I do not find the case for a small business set-aside compelling enough to warrant establishing this precedent in research funding.

Possible Causes of Underutilization of Small Firms

More objectively, however, I believe that the set-aside provisions solve only one of several possible causes of the problem of underutilization of small business in federal research. I see some of these possible explanations as the following:

1. Big government agencies prefer to contract with big business and big universities in order to: (a) simplify the process of contracting for and monitoring research projects, and (b) minimize the second-guessing of funding decisions.
2. Government contracting agents are ignorant of qualified small business contractors.

3. Qualified small businesses are unaware of federal research opportunities.

4. Small firms are intimidated by federal red tape and, thus, do not seek government contracts.

5. Small firms are not adequately financed to withstand bureaucratic delays in decision making or payments.

6. Some agencies discriminate against all profit-making firms. (To many agencies in the Department of Health and Human Services "profit" is a dirty word.)

7. In some instances, small firms simply are not qualified to conduct a particular project because of its large scale nature. (In these situations small firms should still be involved as second tier sub contractors.)

Set-asides address only the first cause. Furthermore, they are not likely to produce major incremental benefits beyond those that can be obtained by simply demonstrating Congressional concern through the establishment of SBIR programs. Moreover, Congressional review of the progress of these programs, as established in H.R. 4326, should provide a continuing incentive to bureaucrats to utilize the small business sector.

RECOMMENDATIONS

In addition to the bill being considered by this committee, other opportunities will soon arise for Congress to address some of the special problems of small research firms in obtaining federal grants. For instance, the Delinquent Payments Act (S.1131), or its House of Representatives counterpart, the Prompt Payments Act (H.R. 4709) would help alleviate late payment problems (point #5 above). Federal procurement policy will also be under review, and the special problems of understaffed, smaller firms need to be considered in this area (point #4 above).

It seems to me that it would also behoove the Small Business Administration, with the assistance of the Office of Science and Technology

Policy, to expand and make better use of the Procurement Automated Service System (PASS) to match up qualified small firms to agency research needs (points #2 and #3 above). The Small Business Administration should exert a concentrated effort to see that small, high-technology firms are in this system's data base. Merely printing requests for proposals in *Commerce Business Daily* is insufficient. This seems to me to be a productive use of SBA and OSTP resources.

In conclusion, while the intent of the Small Business Innovation Development Act is laudable, the set-aside provisions of the bill are unlikely to produce large incremental benefits over and above those created by a Congressional mandate for SBIR programs without specific funding quotas. I believe this bill will send the right signals to federal agencies to encourage progress in making use of small firms in research programs. It also demonstrates continuing Congressional concern with the vitality of small business. More importantly, I believe it will produce economic benefits that will far exceed the federal funds that are expended in the SBIR programs.

In the long run, however, the best way to encourage small firms to innovate is not by designing special programs or earmarking special funds for small business but rather by removing barriers to competition. In this regard, the tax reform and regulatory reform measures recently enacted will do more to facilitate innovation -- by small and large firms alike -- than will the targeted approach embodied in the Small Business Innovation Development Act. In the final analysis, small firms do not need more direct government help; they merely need to be given a fair opportunity to do what they do best -- produce new goods and services.

FOOTNOTES

1. See, for example, National Science Foundation, "Science Indicators, 1976," National Science Board, 1977; U.S. Office of Federal Procurement Policy and Office of Management and Budget, "Small Firms and Federal R & D," 1977; and U.S. Department of Commerce, "Technological Innovation: Its Environment and Management" (Charpie Report), 1967.

2. Ronald J. Penoyer, *Directory of Federal Regulatory Agencies*, third ed., (St. Louis: Center for the Study of American Business, Washington University, 1981), p. 12.

3. Henry G. Grabowski and John M. Vernon, "Consumer Protection in Ethical Drugs," *American Economic Review, Papers and Proceedings*, February 1977, p. 359.

4. W. Tuddenham, M.D., "Quality Assurance in Diagnostic Radiology: An Irreverent View of a Sacred Cow," *Radiology*, Vol. 131 (June 1979), p. 586.

5. Foster D. Snell, Inc., *Study of the Potential Economic Impacts of the Proposed Toxic Substances Control Act as Illustrated by Senate Bill S.776* (Florham Park, New Jersey, June 26, 1975), p. 92.

6. Quarterly Financial Reports, Federal Trade Commission, as quoted in "Public Affairs Report," Institute of Governmental Studies, Vol. 21, December 1980, No. 6, p. 3.

7. Thomas L. Amberg and Michael R. Montgomery, "U.S. Committee to Hold Hearing on SBA Practices," *St. Louis Globe-Democrat*, September 16, 1981, p. 1. According to a later article (October 24, 1981) in the *St. Louis Globe-Democrat*, the SBA itself verified a 38.8 percent default rate on these direct business loans.

8. Comptroller General of the United States, *The SBA 8(a) Procurement Program -- A Promise Unfulfilled* (Washington, D.C.: General Accounting Office, April 8, 1981), p. 2.

9. *Ibid.*, p. 18.

10. *Ibid.*, p. 6.

11. William H. Reynolds, "Reforming Patent Laws," *The New York Times*, September 15, 1980, p. 15.

12. "Small Business Innovation," Report 97-349, Part I, by Congressman Parren Mitchell, November 20, 1981, p. 12.

13. Tom Richman, "Stanley Mason is Growing Oil on Trees," *Inc.*, August 1981, p. 37.

14. "Small Business Innovation," *op. cit.*, p. 21.

Mr. WALGREN. Mr. Brown?

Mr. BROWN. I want to thank both of you gentlemen for an excellent contribution to the debate on this subject. I think you probably heard the comment I made to the previous witnesses enough to indicate some of my own reservations about the legislation.

Let me ask each of you to comment on an alternative approach to this problem and see how you react to it. It incorporates some of the suggestions made in the testimony of each of you. Suppose instead of this set-aside program for small business R. & D. we restored the Office of Assistant Secretary of Commerce for Science and Technology, or a position of similar status in the Department, gave it the responsibility for the multiple functions that you described, Dr. Tribus, focusing particularly on new ways for industry, Government, and labor to cooperate but including the education, training, capital supply and other things, eliminate the set-aside figure, as Mr. Chilton suggests, and in that process probably save about $20 million based upon the estimates we received yesterday of the cost of administering this program across the Government, which involves literally thousands of contract solicitations, monitoring, and so on.

In line with the administration's philosophy of giving a great deal more emphasis to the Department of Commerce and the encouragement of what you might call a free market approach to the problems of industry today—and I'm commenting here today on the merging of the Department of Energy R. & D. with the Department of Commerce, which they are proposing—we designate this either as an agency for technological development in general, or whatever, and give it about the same amount of money to start with. Say $20 million or $30 million, something in that neighborhood, to start out with, and then monitor it in the way that I think each of you have suggested as to the results that it produced, and give it the responsibility of, in turn, monitoring the overall program without the set-asides in the other departments.

Instead of giving that responsibility to SBA or the Office of Federal Procurement could we put together a reasonable package of this sort which would achieve broader goals at somewhere close to the same cost? I would like to ask each of you to respond to that.

Mr. TRIBUS. I think we certainly could, and I think it would be superior. I am not sure it even takes $20 million to start it, because I think the first thing we need to do is to find out answers to questions raised by my colleague here as to what is happening now, what are the barriers to the smaller enterprises getting into this business; what can be done to encourage them.

A phenomenon which most people don't pay much attention to is this. In a large company where an inventor, entrepreneur type gets frustrated and jumps out and starts his own business because he can't get the big company to do this sort of thing, that has happened so much that many companies accept and encourage it. For example, for a time the General Electric Co. actually had a program to form a joint venture with these people and take part interest in it and allow them to go off and start something and have the right to buy in or have first right of refusal if they were successful.

We need to understand more about whether changes can be made with respect to the way people bid on these contracts. Learn about them. They might even form companies to go and get that business and there wouldn't be any need for a set-aside or any of those things, but just simply to work with the different agencies.

I also want to add another thing. When you get inside the bureaucracy quite often there is a lot of cooperation if the program is put forward in a way that doesn't threaten the agencies. The people in the bureaucracies have their turf. They have their jobs, and know what they are judged on. When you lay down a hard and fast rule for them and they are concious of the other things they have to do, they balk.

But you can go to an agency with something that is helpful and may well find a lot of cooperation possible in Government, and I could conceive of the Assistant Secretary of Commerce for Science and Technology who by then ought to be called an Under Secretary because I think that is more like what the job is, who would have a modest-size staff and would go around and pull the data together and come back to you with proposals that might not even cost $20 million to achieve the objectives you are after.

I would support that over this bill, but I didn't have the alternative to comment on it when I came.

Mr. CHILTON. I would second all that Dr. Tribus said. I think the point that you are trying to get at and the concern that you seem to have is the idea of the SBA as a lead agency. The question is whether they really have technological expertise in that agency, and hence whether they are a proper authority to administer the act. Or, more fundamentally, if we are really looking at the problem of more bang for the Federal buck, why are we casting it with such a small business emphasis?

I would support your suggestion with one reservation. I think that it might be a helpful thing to have people collecting data, trying to evaluate performance, and attempting to work with the bureaucrats in some type of cooperative rather than combative way. I think that is all good. The only reservation that I have would be if you are suggesting trying to set up our own version of MITI. I really don't think that we are going to be very good at working in a centralized way to decide what is good research, bad research, or what areas to focus on in the economy. I think our economy works very well because it is so diverse.

Mr. BROWN. I have a possible modest amendment to this bill which is called a Technology Foundation Act, which incorporates most of the things that I have suggested here. This might be attached to it and made a part of the Department of Commerce or something of that sort.

Mr. TRIBUS. I just want to comment on one thing. I have been looking more and more closely at what MITI does. I do believe we need an Americanized version of MITI. MITI does not dictate policy. MITI enables strategies to be evolved involving their major industries in ways that we can't do.

Now there are people trying to do this in the United States and it is very difficult. For example, not too long ago the Control Data Corp. called a meeting involving—I guess it is yet to come—14 or 20 companies to talk about what they might do jointly to deal with the Japanese threat in the development of peripherals in the computer industry. It was very difficult to hold this meeting because there are antitrust considerations and they had to talk to the people in the Department of Justice and so forth.

The Federal Government could hold meetings involving such people and could promote collaboration and understanding. It should not have the power to coerce, to force people to do things, but it can find areas for cooperation.

Another area that MITI works on which I think is terribly important is to understand whether or not the education offered in our schools of business and in our universities is relevant to the needs of industry as they are understood 10 years out. There is nobody in the United States who is in a position to work on that problem, and again it doesn't mean that they have to dictate it but they certainly can exert a lot of influence in one quarter or another.

I agree that the strength of our economy lies in our diversity and the freedom of people to go do what they think makes sense, but there is a lot in the formulation of the problem in the gathering of the data, in allowing people to come together and understanding their situation, which occurs under MITI guidance in Japan that doesn't occur here. Therefore, I would support the notion of a very American "Made In America" version of MITI.

Mr. Brown. Thank you very much.

Mr. Walgren. Thank you very much, Mr. Brown.

Mr. Weber?

Mr. Walker?

Mr. Walker. No questions, Mr. Chairman.

Mr. Walgren. Mr. Gregg?

Mr. Gregg. Dr. Tribus, it is an honor to have you before this committee, having been associated with Dartmouth College for many years, one of the great institutions of learning, where you were a leader.

You mentioned GAO reports on an annual basis. We heard testimony yesterday from representatives that they felt that the GAO report in the first 2 or 3 years of the legislation would not serve a very good function because there wouldn't be enough data to evaluate effectively and they suggested that we have the report every fourth year. Could we have your reaction to that?

Mr. Tribus. Yes, we are on a learning curve and what is reported in the first year might differ from the subject reported in the third year. I think we would have to understand how the program is working in whatever stage it is. Certainly in the first year we don't expect to see products coming out, but we ought to know, for example, is the problem that the university is concerned about; namely, moneys being diverted from them to small industry—is that happening? If it is, you don't wait 4 years to find it or to get adequate data. You don't want to come in the end of the first year and have everybody screaming bloody murder and you have no facts.

Second, the purpose is to develop innovation. What kinds of things are people asking for support on? What are they doing? Which way are they going? What markets are they aiming for? For example, we had a program in the United States to stimulate the making of freshwater from the sea. My belief is the way that program was run it actually shut off the flow of private funding for that purpose. It was counterproductive. I testified on that, but since people were not gathering data of the sort required to buttress what I had to say, it fell on deaf ears. But the program died of its own weight after spending a lot of money.

I talked to people in industry. I became a consultant in that field, so I got on the inside and I saw Federal programs in support at certain levels cutting off the private flow of capital. You have to understand what you are doing. I maintain based on everything you have heard and everything that has been said here that in fact all of us, you and I and all the people, really don't what we are doing. We are learning and therefore I want the GAO to be helping us draw some lessons as soon as they can and not wait 3 or 4 years.

I don't think we have that much time. Time is our most precious commodity and we have to learn from each of these experiences as much as we can.

Mr. GREGG. Thank you. I appreciate that.

Mr. WALGREN. Mr. Gore?

Mr. GORE. Thank you very much, Mr. Chairman.

I want to clarify for the record a couple of points about the SBIR program that I think may have been a little confusing earlier in the record. Federal funds are only spent on Federal agency objectives, not on commercial activity. The Federal Government supports research or R. & D. at phases I and II of the program. Phase III is the development phase to pursue commercial applications and it is funded with private capital. The private firms, not the Government, determine whether there is a potential market. Each agency would write its own R. & D. needs as topics and these do not include commercial objections. Also, it should be noted that the follow-on private capital obtained by the first phase II winners has increased to $30 million compared to the original Government investment of $5.3 million, almost a sixfold return when looked at in that light.

Mr. Chilton, I have a couple of brief questions for you. On page 5 of your written statement you discuss the SBA's minority procurement program. The SBIR program on the other hand provides grants in two phases, to qualified small technology firms at the preprototype development stage which is the most risky stage in the innovation process. The program encourages these small firms to obtain private follow-on capital, to commercialize the results and I see these as totally different programs, the SBIR and the SBA 8(a). Would you agree with that?

Mr. CHILTON. I would agree with that. The only reason I put anything in my formal report about 8(a) is to emphasize that, indeed, well-intentioned programs can be counterproductive. If these programs are not designed with proper incentives and a good notion of what is to be accomplished they don't accomplish very much.

Mr. GORE. You wouldn't want SBIR in that category?

Mr. CHILTON. I don't think so. If we have a commercially successful project in the SBIR program, the successful firm is on its own and it is off and running. I think that the private sector will take care of things nicely when projects are commercially successful. I foresee many graduates from the SBIR program, unlike the disappointing record of the 8(a) program.

Mr. GORE. Our Investigations and Oversight Subcommittee had a couple days of hearings, and we found a stark contrast between the two programs.

Now you state the same objection that other witnesses have, saying you were against set-asides. You said you are aware of the success of the NSF SBIR program. You are no doubt aware that this program wouldn't be in existence today if a specified percentage of the NSF research budget had not been set aside for it.

Mr. CHILTON. I wouldn't say that I am totally aware of that. I am aware it wouldn't exist if the Congress hadn't basically mandated it to the NSF.

Mr. GORE. Do you believe agencies would on their own volition establish an SBIR-type program without the incentive of a set-aside?

Mr. CHILTON. I am not sure they would do it on their own volition. Again you might almost have to ram it down their throats. But, as Dr. Tribus says, you ought to be sure of exactly what you are trying to do that is going to be beneficial to both the Government and to the agencies themselves if you want to get the bureaucrats to cooperate.

Certainly hostile bureaucrats can wreck a program like the SBIR program. Unfortunately, unless I am misreading information or have bad information, we are currently seeing a version of the "Washington Monument game" going on in the NSF SBIR program. It appears that the budget cuts in the NSF are being disproportionately taken from the SBIR program. So we have to be careful that we are not literally ramming things down bureaucrats' throats because apparently there are ways to get even.

Mr. GORE. Thank you, and thank you, Dr. Tribus. I have enjoyed the testimony. Thank you, Mr. Chairman.

Mr. WALGREN. Could I ask for a little clarification on who is getting even with whom?

Mr. CHILTON. What I am referring to is, that, during the last round of budget cuts, NSF funding was reduced 12 percent overall. This overall reduction translated into a 65 percent cut for the NSF SBIR program. At least that was the figure reported by Congressman Parren Mitchell in his November 20, 1981, report on small business innovation.

Mr. WALGREN. I am somewhat interested in what happens in the National Science Foundation. I find it strange that they are reducing so completely in that area and yet endorsing an initiative in this area. Is there any reason for that, in your opinion? Is that logical?

Mr. CHILTON. No comment.

Mr. TRIBUS. If you accept political reasons, yes there are reasons. The National Science Foundation, as its name says, is to promote the scientific capabilities of the United States and this business of becoming a center for aiding small businesses to be more innovative, that is an add-on, that is a diversion from what I think the NSF ought to be doing and it certainly doesn't help them with their constituency. That is very clear.

I believe that the NSF can operate these programs as a research endeavor and experiment with them but I believe it is a mistake to look at the NSF as a primary agency to be doing this sort of thing.

I have previously testified before this committee that I think the NSF is composed of the wrong people. You know, some of my best friends are professors, so don't get me wrong—I happen to be one myself, but I have also been in the commercial world and I know what it means to try to commercialize a product. I maintain that the procedures and practices and protocols and power system in the NSF just doesn't make it the natural home, except to experiment with the idea.

Their experiment has been successful and I do believe that that kind of activity should be carried on somewhere else and, again, not in such a way that people can slash away at the research budget in order to look good on the record and not do what I think is the intent of the Congress, and which I would support, and I gather my colleague doesn't quite; namely, a set-aside. I think the Congress can make a judgment that if we are spending *x* dollars in development that some fraction of that ought to be in some way going to small business.

You can mandate it or try to figure out the barriers, yet find out the best way to make that happen and, of course, what may be the best way in the end would be one that involves a lot of inducements in which the people in the agencies are also happy with what they are getting and what they are doing. That is one of the reasons I wanted this evaluation done, because I think we want to find our way there.

If you have to do it by mandating it now, I have been on the receiving end of having things shoved down my throat as a bureaucrat and it is not that bad. You get up and do it. I ended up supporting it, providing you follow up and learn from what you have done as opposed to just throwing money at the problem and thinking you have done your job.

Mr. **Walgren**. Mr. Winn?

Mr. **Winn**. No questions.

Mr. **Walgren**. Mr. Shamansky?

Mr. **Shamansky**. Thank you, Mr. Chairman. I would just like to address a general question to both of our witnesses. Is this set-aside concept inherently, implicitly bad, or can it be made to work under certain circumstances? I mean work in the sense that it is worth trying. Would both of you gentlemen care to comment on that?

Mr. **Tribus**. Well, bad and good are relative. I think, given the state we are in right now, I think probably it is better than not doing anything. I think the best solution is one in which we find out how this system can best work to achieve our ends and it probably won't be a set-aside.

When I was involved in giving out contracts, I found—and I know people who now are in that business who also have found—that they have gotten good results with small contractors and that we need to figure out how they can have a larger stable of contractors to choose from, a larger list, how to get to them. How it becomes better known.

I advise small businesses to stay away from Federal Contracts if possible.

Mr. **Shamansky**. Are they counterproductive?

Mr. **Tribus**. Sometimes they are.

Mr. **Shamansky**. Generally are they counterproductive?

Mr. TRIBUS. I don't want to try to answer that. If I were to say something, I don't think it would be solidly based.

Mr. SHAMANSKY. That is part of the problem I am having as I listen to the discussion. If it is only counterproductive once in a while, a small percentage, maybe we should try it.

Mr. TRIBUS. Excuse me. You see, the experiments that the NSF ran suggests that you can have a contracting mode which is not counterproductive, but I am talking about experiences I have had over 30 years.

Mr. SHAMANSKY. Can we learn from the NSF?

Mr. TRIBUS. Yes, that is my point. We can learn but we shouldn't assume we have already learned all there is to know.

Mr. SHAMANSKY. Mr. Chilton, how do you feel about it?

Mr. CHILTON. I have a personal bias against the approach of a set-aside. Let me confess to that.

Mr. SHAMANSKY. Is it philosophical or one based on personal knowledge?

Mr. CHILTON. It is philosophical but at the same time, as I said in my testimony, I am not sure that we are curing the real problem. I think Dr. Tribus has just referred to the hassle factor, if you will, in dealing with the Government. You haven't really solved that by virtue of a set-aside. I list seven things here, some of which you can't even address at all, but are factors in explaining why small business is not participating in Federal R. & D.

Mr. SHAMANSKY. Absent this, would we be better off with the small business interests or the country be better off?

Mr. CHILTON. I think the emphasis on trying to get small business involved in Government research and development is a correct one. I prefer jawboning. The set-aside is like wage and price controls as opposed to a jawboning approach of mandating SBIR programs and monitoring their success.

I think the thing that Dr. Tribus has said—and that I agree with—is that you also need to consider the incentives of the bureaucrats. If this was a private sector problem and not dealing with civil servants you would simply set up salary and advancement opportunities to reward those contract officers who make good use of small research firms.

I don't know what you can do, given the civil service situation, but if I were a private sector person dealing in this environment, I would try to build in some type of salary and promotion opportunity incentives.

Mr. TRIBUS. I don't come down as strongly against the set-asides at all. I just come out with the notion that we don't quite know what is the best way to do it, and I would just as soon start with this and improve it.

When I was in the private sector and dispensed money to people working for me, I didn't hesitate to set aside. I told the directors of my technology centers when I was in the Xerox Corp. that I expected them to spend a certain fraction of their money with universities because that was going to build university relations so we could recruit there and get good people.

That was a set-aside that I did in my budgeting process in private industry. I think it is a perfectly valid thing to do. I think it is a valid thing for the Congress to do. Then I have to go back and find out how that works, whether that is the best way to do it. Can I get results in a better way; can I get better cooperation in some other way?

I think it is a good idea to go forward, but I think you ought to go forward with the idea you are on a learning curve, not that you know what you are doing.

Mr. **Walgren**. Mr. Volkmer.

Mr. **Volkmer**. I am sorry I wasn't here for all the testimony. I would like to ask if either of you believe that any parts of the various agencies conducting research should be exempt.

Mr. **Tribus**. Yes and no. No, they should not be exempt, but I testified I did not want them all to have to contract in the same way. I believe that the process of developing a new heart-lung machine or artificial heart is going to look a lot different than the process for developing a new adhesive and you shouldn't ask people to work in precisely the same way.

There are different kinds of relations and so on. Therefore, I want each agency to figure out how best it could keep these objectives, and indeed monitor whether they were being met, and not put them all in lockstep under contracting, but I saw no reason to exempt anyone.

Mr. **Chilton**. I would concur with what Dr. Tribus is saying. The requirement for uniformity in the bill seems a bit too restrictive. I am sure the intent is good; it is to make it easier for small firms to understand what they are dealing with and how to obtain grants in the program so they are not buffaloed by Government redtape.

But since we are interested in innovation, it seems somewhat inconsistent to curb the creative contribution of individuals within Federal agencies. I think General Patton expressed it very well: "Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity."

Mr. **Volkmer**. Thank you.

I yield back the balance of my time.

Mr. **Carney**. Dr. Tribus, do you think the average small science and technology-based company is going to want to get involved or know how to get involved with the bureaucracy of the SBIR program?

Mr. **Tribus**. Well, maybe not at first, but I can conceive of a program which could be attractive to them. The NSF one apparently has been, and I think other variations on it could be.

If you go to the average, whatever that means, if you go to the average company, small company, and ask them about getting involved with the Federal Government, their first reaction is, "Oh, my God!" They are running without a lot of cash reserve.

They are running without a bureaucracy, and that pile of papers comes in and you have a person there who has never done it before, so the overhead in dealing with the Government is enormous for them. They have never done it before. On the other hand, I can conceive of programs that can be a lot simpler.

By the way, in order to make this program work, I think we are going to have to take some advice Jack Rabinow has given us. Jack Rabinow is probably known to many of you. He is probably one of the most distinguished inventors in the United States. He has a long period of service in the Government as well. He said there has been an extraordinary thing that has happened to the whole business of contracting by project officers in the Government in his lifetime.

In his early days and certainly in my own beginning days in the Government, it was possible for a project officer somehow or other to find someone who had the expertise that was needed, talk to that person, develop a relationship, and finally issue a purchase order to get something done.

Today project officers have to go out with three bids and have all kinds of things you do until, finally, there is very little discretion allowed on the part of the contracting officer. We do all that to prevent crookedness and waste, but actually I think we generate a lot more waste and difficulty in these procedures.

It is that lack of ability to deal in this way with contractors that makes it so hard for a small business. I remember once I had to rescue a company that I inadvertently allowed to get a Government contract. They nearly went under from the burden of trying to deal with the Government because they didn't have ways of keeping the records, they didn't know how to read the boilerplate in the contract, they didn't know what the fine print meant.

So I think we have to learn to do this and that is why I called for more innovativeness.

Mr. CARNEY. Thank you very much, Doctor.

Mr. Chairman, that is all the questions I have.

Thank you.

I want to express the appreciation on behalf of the committee for such forthright and delightful testimony. Thank you.

Mr. WALGREN. The next panel is made up of Donald Kennedy, the president of Stanford University, who is here representing the Association of American Universities; Thomas Oliver, who is professor and chairman of the department of pediatrics from the University of Pittsburgh, representing the Association of American Medical Colleges; and Robert Marston, who has a special relationship with this committee, and I would like to defer to the chairman to introduce Mr. Marston.

Mr. FUQUA. Well, thank you.

I am very pleased and proud of the president of my alma mater—Bob Marston is here today. He has had a very distinguished record, as many of our people have, but I am very happy to have him as a constituent in his new role, coming in as the president of the American Association of Land-Grant Colleges and Universities.

So we are very happy to have you here today, Bob, and also Dr. Kennedy and Dr. Oliver. I am sorry I missed you when I was in Stanford late last year, but we had a nice visit out there.

STATEMENTS OF ROBERT Q. MARSTON, PRESIDENT, UNIVERSITY OF FLORIDA, REPRESENTING THE NATIONAL ASSOCIATION OF STATE UNIVERSITIES & LAND-GRANT COLLEGES; THOMAS K. OLIVER, JR., PROFESSOR AND CHAIRMAN, DEPARTMENT OF PEDIATRICS, UNIVERSITY OF PITTSBURGH, REPRESENTING THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES; AND DONALD KENNEDY, PRESIDENT, STANFORD UNIVERSITY, REPRESENTING THE ASSOCIATION OF AMERICAN UNIVERSITIES

Mr. WALGREN. We will lead off with Dr. Kennedy. Written statements will be made a part of the record, but please proceed as you would like to.

Mr. KENNEDY. Thank you very much, Mr. Chairman. I appreciate the opportunity to not only represent one of Mr. Walgren's alma maters but also the Association of American Universities, a group of over 50 American universities that collectively perform most of the basic research done in the United States.

Mr. Chairman, I appreciate the opportunity to appear before you and your colleagues on the Committee on Science and Technology, to give our analysis of H.R. 4326, the Small Business Innovation Development Act.

In my appearance today I represent not only Stanford University, but the Association of American Universities—a group of over 50 American universities that collectively perform most of the basic research done in our Nation.

Stanford and the other research universities find themselves in agreement with the intent and purpose of H.R. 4326. We concur that small businesses form a productive, innovative sector of American industry, and we hope that a variety of means can be found to keep that sector vigorous and active.

It is an enterprise we at Stanford have particular reason to admire. For at least 30 years, there has been a close and creative relationship between various science and engineering departments at Stanford and the development of a constellation of small, highly innovative local companies in electronics and, more recently, biotechnology. Firms of the former sort have grown to form that extraordinary complex of high technology activity known as Silicon Valley.

As a result of that experience, Mr. Chairman, we think we are in a unique position to understand some of the differences between research and innovation, and I would like to take a moment to explore them. Fundamental discoveries of devices or processes—the laser, the klystron tube, recombinant DNA—most usually arise as a consequence of fundamental research activities.

Seventy percent of that kind of activity, on an aggregate basis, takes place in our Nation's universities. There then follows a period of development activity, in which the basic discovery is refined and its application to commercially significant needs is worked out. This intermediate process, so critical in the transfer of technology, is sometimes carried out in the university, sometimes in specialized research institutes, and sometimes in corporate settings.

Finally, particular versions of the device or process are developed and applied to specific products. Most of the innovation that takes place in small firms, particularly in high-technology areas, involves this last process. In our experience, such activity is appropriate to the commercial setting.

In the cases we know from our experience with Stanford and Silicon Valley, that phase of the process begins after the intellectual stream of the research and development has been spun off from the university.

Thus, it is our view that there is almost no overlap between research of the kind generally supported by Federal funds and innovation as it characteristically takes place in the most creative and productive small business environments. That is our central argument with the present legislation: for the best of motivations, it actually reallocates Federal dollars between totally different sets of purposes.

That, we submit, is not good policy. It is the authorization and appropriations processes that are supposed to compare different purposes and assign them priorities. In this case, funds appropriated for research, including research of the most fundamental long-range sort, would be set aside to serve an entirely different purpose, that of promoting product innovation.

I would note, in passing, that the very use of the term set-aside in this context differs from what is usually understood by that term. Normally, a set-aside represents a reservation of certain funds intended for a single purpose to a special class of performers: small businesses or minority-owned businesses, for example.

The objective and purpose of the funding allocation remains constant; the function of the set-aside is to be sure that a particular category of capable performers gets the opportunity to do the work. But in the present case, the objective is not held constant; instead, funds are being diverted from one purpose to an entirely different one in order to benefit certain performers.

It has been pointed out by proponents of the bill that they do not expect basic research to bear a disproportionate share of the set-aside and that, furthermore, the bill in no way requires agencies to reallocate funds currently going to basic research. I find little comfort in that assurance. The fact is that H.R. 4326 as currently written does permit an agency to meet its SBIR set-aside quota by tapping whatever R. & D. budget it chooses for whatever amount it needs. This so-called set-aside, furthermore, is made after the appropriations committees have appropriated what they consider to be the lowest dollar amounts necessary to accomplish the program goals.

I hope I might make this point a little clearer, Mr. Chairman, by referring to two different kinds of federally funded research that would be affected by the provisions of H.R. 4326. The first, clearly an example of basic research, is high-energy particle physics; the second, equally clear in the applied category, is clinical research.

High-energy physics is essentially an academic enterprise, done by university researchers at three large government-owned facilities in the United States: at Brookhaven National Laboratory, at the Fermi National Accelerator Laboratory in Batavia, Ill., and at the Stanford Linear Accelerator Center.

These three laboratories, in turn, support the work of over 100 institutions nationwide. The reason the work is concentrated in these laboratories is, as members of this committee know well, that most such work can now only be done by large and expensive machines that can generate adequate center-of-mass energies needed to explore new domains.

Now, neither small businesses nor single universities can afford the investment necessary for such machines; accordingly, a transfer of some fixed percentage of these research funds from the national laboratories to small businesses will not produce any high-energy physics at all. Instead, they will be diverted to some entirely different purpose.

The National Institutes of Health has a large intramural clinical research program, in which, among other things, important new anticancer agents are being developed and tested. The Clinical Center at NIH also serves as the organizational focus for a number of large-scale clinical trials of new therapeutic agents, in which several university medical centers typically collaborate.

These and other activities of the intramural programs at NIH are not duplicated in any way by activities in the small business sector. Hence, just as in the case of high-energy physics, none of the dollars set aside from these programs—as the pending legislation would permit—would serve purposes related to those they serve in their present application.

Mr. Chairman, these are not isolated cases. We judge that the vast majority of the work now supported by the funds of the various research agencies of government are not duplicated in the small business sector. Accordingly, to set aside the dollars is to alter radically the purpose for which they were appropriated.

We are concerned, too, that the impact of the effective cuts resulting from the reallocation required by this bill would be greater than the percentage actually set aside. Because of the large fixed costs associated with the conduct of research requiring highly specialized equipment such as large accelerators, research output in some fields is highly leveraged in terms of the available financial support. This means that the diversion of a relatively small percentage of the financial support of such research will cause a disproportionate reduction in research output.

As an example, I will refer to the Stanford Linear Accelerator Center, a research facility with which I am quite familiar. At SLAC's present level of operation, a 1 percent reduction in its financial support would, because of the relatively high proportion of fixed costs, actually result in about a 3.5-percent reduction in physics research output. Similar figures could be given for the other high-energy physics laboratories referred to earlier. Other fields of research are similarly leveraged.

After opposition to this proposed set-aside surfaced among universities, some proponents of the measure claimed that we were simply defending our own self-interest. I gladly confess, Mr. Chairman, that interest in the future of our universities, including mine, can stir me to action. But I also want to report that I have made the most responsible effort I can to gather the views of people in our own area who have been participants in one of the great success stories of small business innovation.

The Small Business Committee report on H.R. 4326 was reviewed by a group of our local small business people, venture capitalists, and others—including one expert cited in both the Senate and the House reports on this matter. There was general agreement that in this sector of high-technology small business, recent changes in the tax laws have made enough venture capital available to secure funding for the best and most innovative ideas; it is pointed out that the perceived demand for much of this kind of support may precede the significant changes in capital gains tax law that made the present venture capital environment possible.

In any event, their view of the proposed legislation is joined by the American Electronics Association, which opposes H.R. 4326. One must note that 72 percent of the member firms of AEA are small businesses which employ fewer than 250 employees. I would urge the committee to take careful account of these views, inasmuch as they come from the very most innovative part of the sector this legislation is designed to help.

Now, Mr. Chairman, I would like to deal with an especially important matter: the claim, made near the beginning of the committee report, that small businesses are underutilized in federally funded research and development. In particular, much emphasis is given to the claim that only 4 percent of Federal R. & D. dollars go to small business. The point is made repeatedly. The Small Business Committee report on H.R. 4326 states that small businesses receive * * * "less than 4 percent of the Federal R. & D. dollar." A dear colleague letter from the House Small Business Committee leadership, dated November 10, 1981, states that small businesses "* * * receive less than 4 percent of the Federal Government's total R. & D. budget." The Senate Report on S. 881 says that "* * * only 3.5 to 4 percent of the Federal R. & D. dollar is spent with small firms."

We inquired of the basis for conclusion that small businesses receive less than 4 percent of the total Federal R. & D. budget, and were informed that the 4 percent figure refers to prime contract awards only. Any amounts received by small businesses under subcontracts are not included in that 4 percent, and therefore the amount of the total Federal R. & D. budget which actually flows to small business is understated by the Small Business Committee's report.

Complete data on just how much of the total R. & D. budget goes to small businesses may be difficult to obtain. But we do have some data on R. & D. dollars which come to Stanford in prime contracts and in turn go out to small businesses. At the Stanford Linear Accelerator, for example, of the fiscal year 1981 prime contract of $65,586,000, nearly one-fifth of the total contract, or $12,635,000, was spent with small businesses.

In fiscal year 1981, our reports under Public Law 95-507 shows that on just the limited number of contracts covered—the only contracts on which such data are available—51 percent of all direct, traceable subcontracting or purchasing dollars to business went to small business ($936,109 to small business and $890,824 to large business).

This, of course, far understates the total amount we spend with small business; it covers only a few large contracts, and it covers only direct expenses. Even on the contracts reported under Public Law 95-507, any expenditures with small businesses which are made from the university indirect cost pool are in addition to those just given. (See appendix A for additional data on Public Law 95-507 reporting at Stanford.)

I am not making the case that all these dollars we spend with small businesses go to research subcontracts. Some do, but others go to purchase supplies and local services. The point is that the stream of research dollars which goes to nonsmall business prime contractors gets rechanneled to a variety of ultimate destinations, one of which is small business itself.

To summarize, Mr. Chairman, we have three reasons for opposing H.R. 4326. The first is that it is not good government; it appears to be creating a set-aside, but it is doing something quite different. It is reallocating funds from one function, approved by regular appropriation, to another—and doing so outside the appropriations process.

Second, we do not believe there is adequate evidence that the problem is serious enough to justify such extraordinary measures. Through subcontracts, small businesses are actually getting very substantial shares of Federal R. & D. outlays.

Furthermore, experts—including those deeply involved in the support and conduct of high-technology small business—argue that the advertised purposes of the bill, those of promoting innovation, are being adequately met by the increased supplies of venture capital made possible by recent changes in the tax laws. We also note that for-profit companies can now compete everywhere on even terms with universities and other nonprofits for research dollars of all kinds.

Third and last, we argue that there is a strong long-term national stake in the maintenance of our research establishment, especially that part devoted to fundamental research. These activities take place predominantly in universities, in large Government laboratories, and in a few corporate settings. They are not to any significant degree activities of small business.

I know this committee does not need a recitation of the arguments for conserving the strength of the scientific enterprise. This measure will reduce it—and will reduce it, as I have tried to show, in a way so leveraged that the damage may be worse than whatever percentage the Congress ultimately decides to grant to the set-aside.

I have often heard it argued that, after all, 3 percent or 1 percent is not very much. But the productivity impact may in fact be significantly larger than 3 percent, or 1 percent; and even if that were not so, I do not believe the argument that we should ignore damage merely because it is smaller than other damage being inflicted at the same time. This bill will exacerbate an already strained budgetary situation. Total nondefense Federal R. & D. has declined in real dollars, adjusted for inflation, by 16.1 percent since 1980, and basic research has declined by 5 percent in that same period.[1]

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[1] Willis H. Shapley, Albert H. Teich, and Jill P. Weinberg, "Congressional Action on Research and Development in the Fiscal Year 1982 Budget." American Association for the Advancement of Science (Washington, D.C.) January 1982.

In fact, the research effort in this country is in deep difficulty, and on that account every additional threat to it should be taken seriously.

I thank you for this opportunity.

[The chart plus the prepared statement of Mr. Kennedy follow:]

Appendix A

STANFORD UNIVERSITY SMALL BUSINESS REPORTS UNDER P.L.95-507*
(Not including data from the Stanford Linear Accelerator Center)

Agency	Total Subcontract and Purchase Commitments	Dollars to Small Business Concerns	Percentage to Small Business Concerns	Dollars to Large Business Concerns	Percentage to to Large Business Concerns
DOE	$121,985	$118,712	97%	$ 3,273	3%
DOD	$717,877	$290,517	40%	$427,360	60%
NIH	$140,821	$ 55,685	40%	$ 85,136	60%
NASA	$ 98,248	$ 57,912	59%	$ 40,336	41%
NSF	$748,002	$413,283	55%	$334,719	45%
Total	$1,826,933	$936,109	51%	$890,824	49%

STANFORD LINEAR ACCELERATOR CENTER SMALL BUSINESS DATA

Total SLAC Budget (FY 81)	Total SLAC Procurements	Dollars to Small Business Concerns	Percentage of Total Procurements to Small Business Concerns	Percentage of Total Budget to Small Business Concerns
$65,586,000	$31,309,822	$12,635,000	40%	19%

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*This represents the data on the 24 FY 81 Stanford University federally funded contracts of $500,000 or more. It includes only traceable, direct expenditures under each such contract.

STATEMENT ON HR4326

"The Small Business Innovation Development Act"

Presented to House Committee on Science and Technology

Donald Kennedy, President

Stanford University

Mr. Chairman, I appreciate the opportunity to appear before you and your colleagues on the Committee on Science and Technology, to give our analysis of HR4326, The Small Business Innovation Development Act. In my appearance today I represent not only Stanford University, but the Association of American Universities -- a group of over fifty American universities that collectively perform most of the basic research done in our Nation.

Stanford and the other research universities find themselves in agreement with the intent and purposes of HR4326. We concur that small businesses form a productive, innovative sector of American industry, and we hope that a variety of means can be found to keep that sector vigorous and active. It is an enterprise we at Stanford have particular reason to admire. For at least thirty years, there has been a close and creative relationship between various science and engineering departments at Stanford and the development of a constellation of small, highly innovative local companies in electronics and (more recently) biotechnology. Firms of the former sort have grown to form that extraordinary complex of high technology activity known as Silicon Valley.

As a result of that experience, Mr. Chairman, we think we are in a unique position to understand some of the differences between research and innovation, and I would like to take a moment to explore them. Fundamental discoveries of devices or processes -- the laser, the klystron tube, recombinant DNA -- most usually arise as a consequence of fundamental research activities. Seventy percent of that kind of activity, on an aggregate basis, takes place in our Nation's universities. There then follows a period of development activity, in which the basic discovery is refined and its application to commercially significant needs is worked out. This intermediate process, so critical in the transfer of technology, is sometimes carried out in the university, sometimes in specialized research institutes, and sometimes in corporate settings. Finally, particular versions of the device or process are developed and applied to specific products. Most of the innovation that takes place in small firms, particularly in high-technology areas, involves this last process. In our experience, such activity is appropriate to the commercial setting. In the cases we know from our experience with Stanford and Silicon Valley, that phase of the process begins after the intellectual stream of the research and development has been spun off from the university.

Thus, it is our view that there is almost no overlap between research of the kind generally supported by Federal funds and innovation as it characteristically takes place in the most creative and productive small business environments. That is our central argument with the present legislation: for the best of motivations, it actually reallocates Federal dollars between totally different sets of purposes. That, we submit, is not good policy. It is the authorization and appropriations processes that are supposed to compare different purposes and assign them priorities. In this case, funds appropriated for research, including research of the most fundamental long-range sort, would be set aside to serve an entirely different purpose, that of promoting product innovation.

I would note, in passing, that the very use of the term "set-aside" in this context differs from what is usually understood by that term. Normally, a set-aside represents a reservation of certain funds intended for a single purpose to a special class of performers: small businesses or minority-owned businesses, for example. The objective and purpose of the funding allocation remains constant; the function of the set-aside is to be sure that a particular category of capable performers gets the opportunity to do the work. But in the present case, the objective is not held constant; instead, funds are being diverted from one purpose to an entirely different one in order to benefit certain performers.

It has been pointed out by proponents of the bill that they do not expect basic research to bear a disproportionate share of the set-aside and that, furthermore, the bill in no way requires agencies to reallocate funds currently going to basic research. I find little comfort in that assurance. The fact is that HR 4326 as currently written does permit an agency to meet its SBIR set-aside quota by tapping whatever R&D budget it chooses for whatever amount it needs. This so-called set-aside, furthermore, is made after the appropriations committees have appropriated what they consider to be the lowest dollar amounts necessary to accomplish the program goals.

I hope I might make this point a little clearer, Mr. Chairman, by referring to two different kinds of federally funded research that would be affected by the provisions of HR4326. The first, clearly an example of basic research, is high-energy particle physics; the second, equally clearly in the applied category, is clinical research.

High-energy physics is essentially an academic enterprise, done by university researchers at three large government owned facilities in the United States: at Brookhaven National Laboratory, at the Fermi National Accelerator Laboratory in Batavia, Illinois, and at the Stanford Linear Accelerator Center. These three laboratories, in turn, support the work of over 100 institutions nationwide. The reason the work is concentrated in these laboratories is, as members of this Committee know well, that most such work can now only be done by large and expensive machines that can generate adequate center-of-mass energies needed to explore new domains. Now, neither small businesses nor single universities can afford the investment necessary for such machines; accordingly, a transfer of some fixed percentage of these research funds from the national laboratories to small businesses will not produce any high-energy physics at all. Instead, they will be diverted to some entirely different purpose.

The National Institutes of Health has a large intramural clinical research program, in which -- among other things -- important new anti-cancer agents are being developed and tested. The Clinical Center at NIH also serves as the organizational focus for a number of large-scale clinical trials of new therapeutic agents, in which several university medical centers typically collaborate. These and other activities of the intramural programs at NIH are not duplicated in any way by activities in the small business sector. Hence, just as in the case of high-energy physics, none of the dollars set aside from these programs -- as the pending legislation would permit -- would serve purposes related to those they serve in their present application.

Mr. Chairman, these are not isolated cases. We judge that the vast majority of the work now supported by the funds of the various research agencies of government are not duplicated in the small business sector. Accordingly, to set aside the dollars is to alter radically the purpose for which they were appropriated.

We are concerned, too, that the impact of the effective cuts resulting from the reallocation required by this bill would be greater than the percentage actually set aside. Because of the large fixed costs associated with the conduct of research requiring highly specialized equipment such as large accelerators, research output in some fields is highly leveraged in terms of the available financial support. This means that the diversion of a relatively small percentage of the financial support of such research will cause a disproportionate reduction in research output. As an example, I will refer to the Stanford Linear Accelerator Center, a research facility with which I am quite familiar. At SLAC's present level of operation, a one percent reduction in its financial support would, because of the relatively high proportion of fixed costs, actually result in about a 3.5% reduction in physics research output. Similar figures could be given for the other high energy physics laboratories referred to earlier. Other fields of research are similarly leveraged.

After opposition to this proposed set-aside surfaced among universities, some proponents of the measure claimed that we were simply defending our own-self interest. I gladly confess, Mr. Chairman, that interest in the future of our universities, including mine, can stir me to action! But I also want to report that I have made the most responsible effort I can to gather the views of people in our own area who have been participants in one of the great success stories of small business innovation. The Small Business Committee report on HR4326 was reviewed by a group of our local small business people, venture capitalists, and others -- including one expert cited in both the Senate and the House reports on this matter. There was general agreement that in this sector of high-technology small business, recent changes in the tax laws have made enough venture capital available to secure funding for the best and most innovative ideas; it is pointed out that the perceived demand for much of this kind of support may precede the significant changes in capital gains tax law that made the present venture capital environment possible.

in any event, their view of the proposed legislation is joined by the American Electronics Association, which opposes HR4326. And one must note that 72% of the member firms of AEA are small businesses which employ fewer than 250 employees. I would urge the Committee to take careful account of these views, inasmuch as they come from the very most innovative part of the sector this legislation is designed to help.

Now, Mr. Chairman, I would like to deal with an especially important matter: the claim, made near the beginning of the Committee report, that small businesses are underutilized in Federally funded research and development. In particular, much emphasis is given to the claim that only four percent of Federal R & D dollars go to small business. The point is made repeatedly.*

We inquired of the basis for conclusion that small businesses receive less than 4% of the total federal R&D budget, and were informed that the 4% figure refers to prime contract awards only. Any amounts received by small businesses under subcontracts are not included in that 4%, and therefore, the amount of the total Federal R&D budget which actually flows to small business is understated by the Small Business Committee's Report.

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*The Small Business Committee Report on HR 4326 states that small businesses receive..."less than 4% of the federal R&D dollar." A "dear colleague" letter from the House Small Business Committee leadership, dated November 10, 1981, states that small businesses "...receive less than 4% of the federal government's total R&D budget." And the Senate Report on S. 881 says that "...only 3.5 to 4% of the Federal R.& D. dollar is spent with small firms."

Complete data on just how much of the total R&D budget goes to small businesses may be difficult to obtain. But we do have some data on R&D dollars which come to Stanford in prime contracts and in turn go out to small businesses. At the Stanford Linear Accelerator, for example, of the FY 81 prime contract of $65,586,000, nearly one-fifth of the total contract, or $12,635,000 was spent with small businesses. Furthermore, as required by P.L.95-507, Stanford reports the amount of procurements and subcontracts on each federally funded Stanford R&D prime contract of $500,000 or more. On these contracts, we report the total amount spent with all businesses and break that down into the percentages spent with small business and with large business.

In FY 81, our reports under P.L.95-507 show that on just the limited number of contracts covered -- the only contracts on which such data are available -- 51% of all direct, traceable subcontracting or purchasing dollars to business went to small business. ($936,109 dollars to small business and $890,824 to large business.) This, of course, far understates the total amount we spend with small business; it covers only a few large contracts, and it covers only direct expenses. Even on the contracts reported under P.L.95-507, any expenditures with small businesses which are made from the university indirect cost pool are in addition to those just given. (See Appendix A for additional data on P.L.95-507 reporting at Stanford.)

I am not making the case that all these dollars we spend with small businesses go to research subcontracts. Some do, but others go to purchase supplies and local services. The point is that the stream of research dollars which goes to non-small business prime contractors gets rechanneled to a variety of ultimate destinations, one of which is small business itself.

To summarize, Mr. Chairman, we have three reasons for opposing HR4326. The first is that it is not good government; it appears to be creating a set-aside, but it is doing something quite different. It is reallocating funds from one function, approved by regular appropriation, to another -- and doing so outside the appropriations process.

Second, we do not believe there is adequate evidence that the problem is serious enough to justify such extraordinary measures. Through subcontracts, small businesses are actually getting very substantial shares of Federal R & D outlays. Furthermore, experts -- including those deeply involved in the support and conduct of high-technology small business -- argue that the advertised purposes of the Bill, those of promoting innovation, are being adequately met by the increased supplies of venture capital made possible by recent changes in the tax laws. We also note that for-profit companies can now compete everywhere on even terms with universities and other non-profits for research dollars of all kinds.

Third and last, we argue that there is a strong long-term national stake in the maintenance of our research establishment, especially that part devoted to fundamental research. These activities take place predominantly in universities, in large government laboratories, and in a few corporate settings. They are not to any significant degree activities of small business. I know this Committee does not need a recitation of the arguments for conserving the strength of the scientific enterprise. This measure will reduce it -- and will reduce it, as I have tried to show, in a way so leveraged that the damage may be worse than whatever percentage the Congress ultimately decides to grant to the set-aside. I have often heard it argued that, after all, three percent, or one percent, is not very much. But the productivity impact may in fact be significantly larger than three percent, or one percent; and even if that were not so, I do not believe the argument that we should ignore damage merely because it is smaller than other damage being inflicted at the same time. This bill will exacerbate an already strained budgetary situation. Total non-defense federal R&D has declined in real dollars, adjusted for inflation, by 16.1% since 1980, and basic research has declined by 5% in that same period.* In fact, the research effort in this country is in deep difficulty, and on that account every additional threat to it should be taken seriously.

I thank you for this opportunity.

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*Willis H. Shapley, Albert H. Teich, and Jill P. Weinberg, Congressional Action on Research and Development in the FY 1982 Budget. American Association for the Advancement of Science (Washington, D.C.) January, 1982.

Mr. WALGREN. Thank you very much, Dr. Kennedy.

I would like to give a special welcome to Dr. Oliver, who comes from the Pittsburgh area, which is my part of the country. We are very proud of our medical community in Pittsburgh and particularly your role in it, and are happy to see you here on this level.

Mr. OLIVER. Thank you very much. As you indicated, I am a pediatrician on the faculty of the University of Pittsburgh School of Medicine, and this year I am chairman of the assembly, which is the highest elected office in the Association of American Medical Colleges [AAMC]. The association is grateful to the Science and Technology Committee for the opportunity to present its views on the Small Business Innovation Development Act, particularly since the Small Business Committee was not able to accommodate a representative from the medical education community during the national hearings that were held last September.

The AAMC has not often appeared before this committee, and I thought I would tell you something about it briefly. It is over 100 years old, serves as the national voice for the 126 accredited U.S. medical schools and their students, for the more than 400 major teaching hospitals in the United States, and over 70 academic and professional societies whose members are engaged in medical school teaching, patient care, and biomedical research.

Collectively, these academic medical centers are the single largest producers of the new scientific and technical knowledge in the health field through the basic and applied research they conduct. This research is the wellspring from which applied research flows, both in the academic medical center and the business world. First, the committee should be assured that the association believes that fostering and exploiting the capability for innovation of small business is a laudable goal. This segment of the commercial and business community has contributed valuable products, growing out of basic discoveries made in research institutions, to the economy.

However, the association is profoundly convinced that the mechanism proposed to assist small businesses in their enterpreneurial enterprise—set-asides derived from levies on the research and development budgets of the Federal science agencies—is bad public policy, an impediment to scientific progress and thus deleterious to the future health and well-being of the American people.

A careful reading of the legislative history of this proposal indicates that the set-asides are to be dedicated to funding two types of proposals submitted by small business firms: one, for research and development within the ambit of the mission of the funding agency; the other for the development of innovative products, goods and services based on recent scientific and technological advances. Each warrants examination.

SMALL BUSINESS RESEARCH

The association is convinced that no special mechanism is necessary for the first of these, and that indeed the creation of one would subvert and corrupt the traditional policy of awarding Federal research and development funds on the basis of the technical merit of the work proposed and the competence of the performer. Let me amplify.

"For-profits" are now eligible to submit unsolicited proposals to virtually all of the Federal agencies that support extramural R. & D. programs. The last significant barrier disappeared in January 1982, when the Public Health Service [PHS], which includes the National Institutes of Health [NIH] opened its grant programs to for-profits.

The NIH had been strongly censured by representatives of the small business community for the closed-door policy that was recently abolished. The fact of the matter, however, is that even before that exclusion was imposed about two decades ago, few for-profits applied for research grants. The probable explanation is the previously prevailing patent policy.

Patent disincentives—in practical if not legal terms, the real bar to small business participation—disappeared with the enactment of Public Law 96-517. This statute radically modified Federal patent policy for academic institutions and small business. It allowed them to retain title to inventions resulting from federally-funded research. Thereby participation in Federal R. & D. programs became far more attractive to business enterprises.

With the new patent law and the change in PHS grant eligibility in effect, the association sees no need for a special set-aside for small business research and development. These organizations should compete for available funds on the same basis as all other applicants and be judged on the scientific and technical merits of their proposals by the peer review processes that have functioned so well as quality control devices for federal research programs.

More importantly, this class of applicant should not, if unsuccessful in obtaining funds through the time-honored competitive peer review process, be given a second chance for support by having access to a set-aside, dedicated solely to small business applicants. By the same token, funds should not be denied to more meritorious applicants from the nonprofit sector in order to fund small businesses. The issue invovled is not only one of fairness; it would be a public scandal to support lower quality research when higher quality applications already in hand are not being funded. A dual standard of quality, one for nonprofits and a lower one for profit-making performers is indefensible public policy.

A set-aside for research by small business is thus both unnecessary and undesirable.

SMALL BUSINESS "INNOVATION"

Proponents of this bill tend to minimize the significance of the line of argument just cited since, in their view, the forte of small business is not research but a unique capacity for achieving the second goal of the bill, the introduction of innovative products into the economy.

The legislative history of H.R. 4326 indicates clearly an intent to assign a new role to Federal R. & D. agencies, or at least those that support R. & D. In the biological, behavioral, and medical sciences: the continuation of the research and development process to actual tooling up for the production of goods and services.

In our free enterprise system, this latter function has traditionally been not only the responsibility but, also, the special and cherished opportunity, of the commercial entrepreneur, operating within the framework, methods, styles, and standards of the mercantile system. Why should this function suddenly become a public responsibility? What would be the consequences of such an expansion of Government's role?

One might ask why research should not also be a private sector responsibility. Research has been heavily subsidized from public funds as a social good, for the obvious reasons that new scientific knowledge is not only the fountainhead of technological progress, but also has no viable source of support other than Government.

It is essentially axiomatic in economic analysis that private sector companies underinvest in research, since the investors cannot capture exclusive rights to the wealth that might accrue through exploitation of the results which they fund.

Presumably the rationale for now turning to the Government for the support of bringing products to the marketplace is that without it, the Nation's capacity for this vital activity will be seriously impaired. The association is profoundly unpersuaded.

In the field of medicine, there is no discernible lack of this activity. Commercial organizations, large and small, have favored us with a cornucopia of new products and services. Look only at the mind-boggling instrumentation ensemble in coronary intensive care units, at the complex array of equipment in modern departments of diagnostic or therapeutic radiology, at the extensive portfolio of laboratory measurements available from clinical pathologists or at the vast catalogue of powerful drugs and effective devices from which physicians can prescribe.

Entrepreneurs seem to have had little difficulty in funding their efforts through earnings, borrowings or equity capital for the simple reason that really good products and services for both health care delivery and biomedical research can be very profitably marketed.

In the last 12 to 18 months, small business concerns proposing to exploit new discoveries on how DNA strands can be sliced and spliced, and on how clones of cells capable of producing single specific antibodies can be isolated and used to produce valuable biologicals, have been spectacularly successful in equity markets. Where is the evidence that private sector financing is unavailable?

Even if market imperfections in meeting capital needs could be convincingly demonstrated, why would it not be more appropriate for Government subsidies to business to take the traditional forms: of tax incentives beyond those enacted in the last session of this Congress; of loan guarantees; of interest subsidies for private sector loans; or even of direct loans, at whatever interest rates might be required to accomplish the objective.

This well-intentioned bill, ironically, could have the effect of subsidizing losers, since the winners, that is, companies with really good ideas for marketable products, would use traditional private sector resources, rather than get involved with Government and all that that entails; the Government would be left holding the bag of proposals that private financiers had found unattractive.

THE PRICE OF SET-ASIDES

If the set-asides, as proposed in H.R. 4326 should become law, what harm, other than an unnecessary and less than optimal use of modest amounts of public funds, would result?

First of all, it is important to note that the amounts are not modest; the Congressional Budget Office estimates that a 3-percent tax on the R. & D. budgets of the cognate Federal agencies would amount to about $1.665 billion in fiscal year 1986.

More importantly, it should be noted that the average annual rate of growth over the last 2 years in appropriations for the NIH, the major Federal support agency for biomedical research, has been only 5 percent.

Furthermore, growth in real dollars, that is, in what goods and services the money can purchase, has declined by a little more than 4 percent per year over the last 3 years, because the rate of inflation has far outpaced increasing appropriations. The scientific community is at this very moment anxiously awaiting the President's budget for fiscal year 1983 to find out whether further reductions predicted by OMB last year will materialize. Thus, the proposed set-aside represents, both absolutely as well as relatively, a large additional decrement to already severe progressive retrenchments in research funds.

These funds are diverted from the creation of new knowledge, the long-term wellspring of all innovation, to the short-term exploitation of the existing, finite and exhaustible storehouse of current knowledge to produce practical goods and services. Thus, it stimulates consumption of the seed corn on which future harvests depend.

The substantial diversion of support, from science and technology to practical art, is costly not only in terms of the science not done, and the scientific manpower not utilized, but also in the expensive demands it places on the operations of Federal agencies. To establish small business innovation programs, they will have to create parallel peer review systems for this new genre of activity since the existing ones, for the most part, are not suited, especially temperamentally, to deal with a different class of projects. The costs include not only those of funding the creation and operation of an external advisory apparatus, but also those incurred when Federal personnel, already in short supply in the R. & D. agencies, are transferred from understaffed programs and committed to the support of new ones.

CONCLUSION

The association hopes that this summary of its position persuades you that its deep misgivings about H.R. 4326 are well founded and not frivolous or self-serving. As stated, it perceives that the effects of the bill would be bad for public policy, lead to bad science, and represent a totally unnecessary expenditure.

The AAMC does not begrudge small business firms as much of the Federal R. & D. budget as they can win in open competition, be it 1 percent, 3 percent, or 20 percent. But they must win it, fair and square.

The AAMC could support a program of small business subsidy for products based on science and technology: Provided it were demonstrated to be necessary; provided the appropriate mechanisms—further tax incentives, loan guarantees, interest subsidies, direct loans—were adopted, and provided a dedicated new appropriation was made available, preferably through the Small Business Administration [SBA], accustomed to dealing with this community of enterpreneurs.

The canard so frequently heard, that it is pusillanimous of the academic community to object to this so-called trivial 1 or 3 percent tax on Federal R. & D. budget, cuts both ways; if the amount is that small, a separate new appropriation would not create any substantial additional strain on the Federal budget.

RECOMMENDATIONS

What course of action should be taken? The association recognizes the jurisdictional problems created by the bill. The Small Business Committee has proposed statutory earmarks on programs in the arena of responsibility of a number of other committees—Veterans' Affairs, Energy and Commerce, Armed Services, Science and Technology, Agriculture.

The options available to this committee are better understood by you than by the AAMC, but they at least include radically modifying the bill or recommending its outright disapproval, this association's preferred outcome.

Our major fallback recommendation, were our preferred outcome impossible, would be exemption, at the very least, of agencies supporting biomedical and behavioral research—the NIH, the Alcohol, Drug Abuse and Mental Health Administration and the Veterans' Administration—from the requirements of the bill.

The amendment to the Senate counterpart of H.R. 4326, introduced by Senator Schmitt, to protect national investments in basic research, would not be helpful in the biomedical and behavioral areas. The appropriations and budget requests of these agencies do not differentiate between amounts for basic research, for applied research, and for development. Such determinations require difficult to impossible distinctions, except at the extremes. Further, a number of proposals that, in essence, tinker with the legislative language in the hope of taking some of the sting out of the bill as written would not in the association's view significantly improve a grieviously flawed concept.

I thank you very much for giving me the opportunity to speak before your committee.

Mr. WALGREN. We appreciate your testimony very much.

Mr. MARSTON. Mr. Chairman and members of the committee, I would like to summarize my longer testimony, which I understand will be included in the record.

In being brief, I don't want to be misunderstood. In my longer statement, I describe for almost 2 pages our agreement with the objectives of H.R. 4326, and I share with my colleagues the support for small business in this country.

A central concern with small business innovation research legislation is its potential impact on the conduct of basic research. All sectors of American society recognize the great significance of fundamental research in the sciences and the need to maintain this research for the future strength of the Nation's economy, national security, and general well-being.

Basic research forms the basis for all of the applied research and development that follows. Yet basic research comprises a relatively small portion of the Federal Government's total cost for R. & D., about $5.5 billion annually, or less than 15 percent of the total.

By design and with a record that suggests wisdom, the Nation has located most basic research activities on university campuses where inquiries into new knowledge find a receptive home and where the training of young scientists and engineers occurs side by side with the conduct of basic research.

The set-aside proposed in H.R. 4326 will harm, not help, the Nation's basic research efforts since funds from basic research will be transferred to SBIR's, which almost entirely, with few exceptions, will not involve basic research.

This cut would be in addition to the already seriously restricted budget for basic research at the very time in our history when the outlook for fruitful research in the biological sciences and in the physical sciences is better than in any time in the history of the world.

We are concerned that because of their long-term commitment to development projects, such as new weapon systems or the Shuttle, agencies will feel compelled to protect those projects at the expense of basic research, from which more than a small percentage may be taken to meet the new law's requirements.

Senator Schmitt recognized these problems, as did others, in the debate in the Senate. However, even if his amendment were to be in the final law and even if agencies were somehow prohibited from reprograming basic research funds by some method of reclassification, we would still have our basic concern that the precious dollars will be lost from basic research support.

Since the most important benefits occur at the margins of support, the loss of that 1 percent or 3 percent will be far more significant than the percentage figures suggest.

I would like to add to my submitted testimony a consensus of recommendations from the three organizations testifying today. These recommendations state in order of preference the consensus position of these three organizations.

We believe that recommendation one meets the stated need of the small business community by providing them the means to obtain fair and full access to the R. & D. procurement process.

Recommendation two, less satisfactory to us, returns the decisionmaking process to the responsible legislative committees.

The final two recommendations would amount to a partial effort to make the best of an unfortunate piece of legislation.

The first recommendation would be to establish within each agency a small business office that will be charged with providing information and assistance to small businesses that wish to apply for R. & D. grants and contracts.

Congress should assure that office is properly staffed to meet the needs of small business.

A less satisfactory recommendation would be to change the small business bill so that SBIR's are established in each major R. & D. agency subject to regular congressional authorizing and appropriate processes.

If neither of these were acceptable, then we would recommend that NIH and NSF be exempt from the bill's coverage, the NIH because of the special nature of biomedial research and the NSF because it already has a program to meet these objectives and needs; second, to eliminate basic research from the tax base to add language to the bill that mandates that no funds appropriated by the Congress and intended for basic research shall be expended on SBIR's.

A final recommendation is offered because we believe that Congress will make a great mistake if it passes this bill and turns its back on what it created. We believe the bill will be the cause of great future embarrassment, although we hope we are wrong.

Therefore, our final recommendation is as follows: In the event the Science and Technology Committee recommends passage of H.R. 4326, it should also recommend a change that would authorize continuing oversight by those committees of Congress having appropriate agency jurisdiction.

The authorizing committees would be required to report to the Congress on the effectiveness of the legislation.

Thank you very much.

[The prepared statement of Mr. Marston follows:]

STATEMENT OF DR. ROBERT Q. MARSTON, PRESIDENT, UNIVERSITY OF FLORIDA, ON BEHALF OF THE NATIONAL ASSOCIATION OF STATE UNIVERSITIES & LAND-GRANT COLLEGES

Mr. Chairman and Members of the Committee, I am Robert Marston, President of the University of Florida, and I appear before you today to represent the views of the National Association of State Universities and Land Grant Colleges (NASULGC) on H.R.4326, Small Business Innovation Research legislation. The Association is comprised of one hundred and thirty nine institutions, and their contributions to the enhancement of life in this country and among all humankind form a proud chapter of America's history.

During my career as teacher, scientist, science administrator and director of the National Institutes of Health, and in the past eight years, as president of a research intensive university, and during that period also as chairman of NASULGC committees responsible for health research and energy research policy, I have come to understand something about the nature of this nation's research systems, what nourishes and enhances them and what places them into danger of losing their high standard of excellence. It is from this perspective that we present this statement.

Our colleagues in the Association of American Universities and the Association of American Medical Colleges also are testifying this morning. May I stress, Mr. Chairman, that while the witnesses' statements may stress differently our concerns related to the proposed SBIR legislation, in all essential matters regarding what the bill is expected to accomplish and the harm it might cause as now constructed, we are in agreement.

Concern With Mechanism Not Objective Of H.R.4326

At the outset, we wish to emphasize that we do not come before this committee of the Congress to counsel against the notion of legislation that would provide more opportunities for small businesses to undertake research and development projects with the assistance of federal support. During hearings held by the Small Business Committees in both Houses we graciously were given the opportunity to testify, and attempted then to emphasize our essential concerns. We continue to believe that in the quest to achieve a positive objective of assisting small business, Congress, in the bill before this Committee, inadvertantly would mandate creation of a major new program throughout the federal agencies that would result in basic research in the sciences suffering serious,if initially imperceptible, harm. We recognize that cosponsors of the legislation in each House of Congress include many staunch and proven supporters of research. Ironically, without intention, they would permit mischief to develop from the pending legislation. Mr. Chairman, you and your committee have been at the forefront of legislative campaigns to enhance science research. We hope to convince you and your colleagues of the need to review the implications of H.R.4326 as it now stands and to take action that will protect the science research activity you have helped construct. We fear that if the Congress does not reject the simplistic proposals in the Bill, all of us concerned with highest quality research will rue the day of enactment, when, in short order, the avoidable results of the proposal return to mock our inaction now.

We hope that our position regarding the intended beneficiaries of the bill is accurately perceived. We know fully well of the capabilities of small high technology business to do sound science. We understand that the SBIR program administered at the National Science Foundation, under the jurisdiction of this committee, has shown good potential in its initial years of operation. We further note that promising efforts are under way to create new bridges between the academic community and small business in areas where cooperation is natural and mutually beneficial. Indeed, in a large majority of SBIR projects at NSF funded to date there exists an academic relationship to the project. Last year, during the legislative processes that lead to the passage of the new patent law, small business and higher education worked jointly and sucessfully toward the enactment of that law. We are deeply concerned that our disagreements with significant aspects of the pending legislation not lead to conflict between our two sectors, and instead, that Congressional action affecting research provide opportunities for further cooperation.

Current Support Of Basic Research

The entire context of research is important background for our views. For many years of the past decade, the Federal Government's support for most areas of basic research decreased in constant dollar terms. During the Carter Administration, policy was adopted to reverse this trend and aim towards restoring federal funding of basic research to levels necessary to maintain the capacity of American science in its service to the nation's economy, its health, and its national security. Some improvements in funding levels occurred. Ironically, the nation's decision to enhance funding came just at the time when, in the view of federal policy makers, the state of the economy would deny them the wherewithal for effecting this prudent decision.

The Reagan Administration's policy concerning basic research, with certain modifications, has confirmed the role basic research must play in the nation's life, and, in several instances in the past year, the Administration appeared to try to protect basic science research programs from cuts experienced generally across the federal agencies. But reductions still have occurred. For example, in the March, 1981 budget submitted to the Congress, President Reagan requested

$3.672 million for NIH. This was an increase over FY'81 by about $150 million. But in constant dollar terms, the request by the President was $370 million short of level funding with 1980, a 10% shortfall in just two years in funding for the federal government's largest research agency. The 4% cut in the current Continuing Resolution reduced funding still more. Similar scenarios can be drawn for the other major research agencies and in some cases, such as the Department of Energy, it would appear that the situation is considerably worse.

There is a point of view that says every subsector of American society should take its "fair share" of cuts. The Reagan Administration rejects this simplistic view as mindless. Surely DOD will be treated differently than DOL. But the truth is that, despite the significance of research to central national concerns, it has incurred serious cuts. Further cuts, in retrospect, will be seen as reckless.

We will not see the Administration's proposals for 1983 until February 8. From what Administration spokesmen have been saying publicly, we surmise that, because of a genuine understanding of the significance of basic research to the economic and national security goals of the Administration, basic research will not suffer to the degree that other education programs such as student aid will. Comparatively, basic research will be supported.

But what the spokesmen are not saying is that plans to spend $200 million annually for instrumentation to enable major research laboratories to replace obsolete equipment and allow them to conduct research at the frontiers of knowledge will not take effect. Understandably, these statements do not stress that adequate funds to support the most talented and brightest of our next generation's scientists through graduate studies and research in the early post doctoral period will not be available. They do not comment on the obsolescent academic facilities that are serving to help induce some of the ablest academic researchers to leave basic research in the universities for well appointed laboratories of industry. Nor do they say how much the average grant award in the major agencies will have to be trimmed in order not to reduce the number of awards and thereby keep fine research teams together during this period.

For the United States, with its recent decades of world leadership, it certainly is a painful, if realistic point of view that has been voiced by a key administration official who argues that some of the sciences must be considered marginal as far as federal support goes, that this nation does not have to be best in every field of science. In sum, Mr. Chairman and Members of the Committee, the situation in which basic research finds itself in 1982 is an anxious one for the scientists who practice their skills in basic research, for the institutions that provide their home base, and for the nation that depends so much upon their productivity.

H.R.4326 - Potential Impact On Basic Research

Into this moment comes a proposal to create a new program that, in the Senate version of the bill, would amount to about $400 million annually when fully phased in, and in the House bill would amount to $1.2 billion annually. Clearly, it is addressed to that small percentage of small businesses engaged in high technology. Of these, we are informed by scientists deeply involved with small businesses, the most productive and innovative do not need federal funds and may even shun the concomitant entanglement with federal regulations and paperwork. The proposed bill is unlikely to accomplish its aims. Witnesses from high technology organizations may address this point. We accept the premise of the bill and look at its mechanism.

From the introduction of early versions of the bill in the last Congress to this time, we have expressed two major concerns. The first is that disproportionate amounts of basic research funds could be taxed within the agencies in order to fulfill the quotas required by the new law. Second, basic research dollars could be diverted to the SBIR program, and, however worthy the activities conducted, generally they would not be basic research.

The first concern was based on the realization that in most agencies supporting research, the high priority items were in the phases of development to which long term committments have been made. It seemed unlikely that NASA officials would divert funds from the space shuttle or that DOD R&D directors could take funds from an MX missile or B-2 bomber, items that comprise the greater part of the agency's total R&D budget that serves as the base for determining SBIR funds. Eliminating major development programs from taxation for the SBIR's would mean that in order for the agency to comply with the law and meet its quota of R&D funds it would have to turn to the more elastic dollars not identified with a particular weapon or system or product, the basic or exploratory research funds. The impact on basic research in that case could be many times more than the one percent or three percent called for in the current Senate and House bills. Such acts would impose an untenable burden on American science for years to come. Fewer ideas to be developed into products, fewer people capable of the most creative and innovative scientific work would be among the deleterious results.

The Senate's Attempt to Protect Basic Research

Sen. Henry Jackson, during Senate consideration of S.881, expressed this concern, (quote from the Congressional Record, December 7, 1981 page S 14614.)

> Another concern I have is that the 1-percent setaside not rise higher than that percentage for basic research projects. As one looks across the agencies, there are whole areas of development in the R&D budgets which may be held harmless to such a set-aside; and as a result, basic research budgets could suffer inordinately. Applied research and development projects can be committed far in advance. In such a case, the actual cost to basic research would be greater than its original pro rata share.

During its final actions of passing S.881, the Senate recognized this problem and adopted an amendment introduced by Sen. Harrison Schmitt. The intention of the amendment is to restrict the taxation of basic research dollars to 1% of their total. The amendment has value in that it is a clear statement of the Senate's intentions, and in some agencies it conceivably could achieve its objective. We fear, however, that it may fall short of the mark.

To begin with, it approves of the 1% taxation on basic research dollars, which would amount to $55 million in the Senate bill. Extrapolated to the House bill, the costs for basic research dollars would be $165 million. In the light of the funding circumstances for basic research discussed earlier, we feel strongly that even a 1% set-aside is a serious misuse of federal funds. The other problem with the Schmitt amendment involves the conundrum of definitions. How much of the more than $900 million of research at NSF is basic research? How much of the nearly $3 billion at NIH will be protected by the 1% rule? We believe that these two major research agencies will be hard put to come up with precise answers. How much more reasonable and effective it would be for specific line item programs for SBIR's to be established by the Congressional authorizing committees, where it might be appropriate in some of the agencies, with Congress determining annually the amount of funds that ought to be spent in each of them.

A potential loophole in restricting the tax on basic research to a given percentage lies in the potential freedom of agency officials to reprogram funds. If agency officials, under pressure to attain its mission, feel the need to protect development dollars, they might be free to convert dollars originally intended for basic research to development funds, subjecting them to the SBIR taxation, and basic research resources might lose considerably more than the small percentage suggested in the Senate bill.

It is noteworthy that during the Senate floor action on S.881 not only was the Schmitt amendment adopted to try to prevent excessive taxation of basic research funds by agencies required to fulfill the set-aside requirements of the proposed law, but several Senators who supported the bill and voted for it stated their doubts in the wisdom of cutting even 1% of basic research. They expressed the hope that further protection of basic research would be worked out in the conference between the House and Senate on this legislation.

Solutions to the problem of protecting basic research funds are difficult to come by, since they would have to avoid a great number of pitfalls while resolving differences in the programs of the various agencies and in the agencies themselves. In some, such as DOD, research that can be defined as basic research is more easily identifiable. DOD has its R&D program divided into five categories ranging from basic research to highly advanced engineering. NASA's space sciences that fit the definition might be identifiable as basic research. But at NIH, the nature of the work supported by the agency does not lend itself to simple definitions even if the agency does provide a figure each year for basic research and applied research. It would be more reasonable to exempt the entire agency because of its special mission, rather than to try to determine which of its program categories, such as investigator-initiated projects or intramural research, meets the test of basic research for purposes of exclusion from an SBIR program.

Diversion of Basic Research Funds

Our second area of concern also should not be perceived as a denigration of small businesses' capacity for productivity. The very nature of this program - providing support to small businesses for developing ideas that will reach the market place as products -- militates against performance of truly fundamental or exploratory research. Some small businesses might be engaged in basic research by any definition, and in such cases their proposals can be evaluated alongside all others in the discipline and the most meritorious supported. We believe, however, that the preponderant number of applications stimulated by an SBIR program would be along lines for which small business is noted, innovative approaches to the development of technology. There is a logical partnership in research between academic research centers and small businesses, -- the former performing best in the area of fundamental exploration, in the quest of new knowledge, and the latter taking the findings of the basic research scientist and moving them forward toward new materials, new products, new methods, and the market place. Whether it is $55 million, $165 million, or variations of that, these dollars will come out of basic research but generally not be used for basic research. The SBIR work done may be valuable, but the nation will have depreciated its support of basic research by that amount at a time such reductions can be ill afforded.

Significance of Small Increments of Funds to Basic Research

There are important unknowns in the successful pursuit of basic research. Experience has taught the leaders of the disciplines which students are likely to make the greatest contributions and which disciplines are on the verge of breakthroughs, but precise predictions are not possible to achieve any more than the outcome in a given research project. What we do know is that the discoveries that the most creative minds make, do not happen "no matter what." It is not accident or a piece of luck or a blessing on a more deserving people that this nation has become the leader in so many fields of science research.

The ambience of academic freedom certainly has helped. Productive competitiveness in the spirit of this country has aided as well. But little would have occured without the support from the universities and their donors, from the private foundations and, especially in the past three decades, from the federal government. Pouring money into a project does not guarantee creativity, but because so much creativity occurs at the very margins of research, programs now funded well below their optimum levels may find their productivity disproportionately decreased by further reductions in support.

It may seem that one percent of funds in any given program should not be that significant, but $55 million annually, and certainly $165 million annually, spent on replacing obsolete instruments in our laboratories or spent on pre-doctoral fellowships for the most gifted of our science students or spent on research grants for young Ph.D.'s just ready for their first major contribution to their disciplines is significant indeed.

It is reasonable to assume that Congress' annual appropriations for any agency's research program contains no surplus funds. In fact, given the fiscal constraints of recent years, appropriation levels must be considered to be close to or at the minimal level of support. We need only compare the inflation rates of recent years with the rates of increase for basic research in the several agencies to note that budgetary pressures have led Congress to authorize funding at levels considerably less than they might have in better times. This year, an additional element was added in the appropriation process. After both houses of Congress had determined funding levels, in order to pass a continuing resolution, they were constrained to reduce those levels by 4%. We respectfully submit that it would be unwise public policy for the Congress to subject the programs on which we depend for the future breakthroughs in knowledge that lead to applications affecting the welfare of our economy, our national security, our health, to still one more reduction, however worthy the purpose.

Basic Research and Graduate Training

Our concern for the support of basic research is heightened by a second mandate for the universities intrinsically tied to the conduct of research, training the next generation of scientists and engineers who will carry on the work of seeking new knowledge in the many scientific disciplines. The surge in support for science and engineering that followed the flight of Sputnik lead to the establishment of many new federal graduate education programs. In the broad array of agencies, including DOD, AEC, NASA, NSF, USOE, HUD, NIH, predoctoral fellowship and traineeship programs were the mechanism for a major expansion of the nation's research capabilities in the 1960's and early 1970's.

For several reasons, primarily budgetary restrictions, all those programs, with the exception of the small one still maintained at NSF, have been terminated. Training for candidates for Ph.D.'s in the sciences depends greatly on the amount of basic research grant funds that reach the laboratories of our universities. A large number of our cadre of young research scientists paid their way as research assistants to senior scholars whose research projects were funded, at least in part, by federal basic research grants. The cost of education and training of these young scholars has been increased by inflation at a time when funds available in research grants to help cover their training costs have decreased.

The Wisdom of Retaining Authorizing Committee Jurisdiction Over Research

Earlier in this text we noted our support for the SBIR program at NSF. For many federal programs there is a question over which words of the title are to be emphasized. For example, is the key term in the proposed bill "Small Business" or "Innovation Research"? That the legislation originated in each house in the Small Business Committee attests to the sense of responsibility in those committees for the sector of our society within their jurisdiction. However, in order to benefit that sector or assist it in fulfilling its potential, the Small Business Committees chose to turn to another jurisdiction, that of research.

The reason for the initial progress of the SBIR program at NSF is that it is a research program operated within a research-oriented agency using the same high standards for that program as it does for all others. At NSF, it may grow and produce good science comparable to programs conducted in other sectors. Each year, the NSF must be reauthorized by this committee in the House and its counterpart committee in the Senate when the SBIR program may be monitored and evaluated. Each year, two Congressional committees must determine appropriations for the agency within the limitations determined by the authorization committees, and if they choose, direct attention to the SBIR program.

In what we think was a wise action, the Senate Committee exempted intramural research at NIH from the one percent tax for SBIR's. Would not this kind of decision be better made by the House Energy and Commerce Committee and the Senate Committee on Labor and Human Resources, whose responsibility for NIH has been determined by the rules of the Congress? In the Department of Defense there is a funding category known as "6.1" that supports basic research. Its funds this year amount to only a little more than 3% of all R&D at DOD. It is primarily this relatively small sum about which we are raising concerns today. The Armed Services Committees in the Congress might favor a DOD SBIR program, but might determine in law that funds for SBIR's not be taken from the 6.1 category for the new program - (and might even seek to exclude certain "6.2"funds) on the logic that a proven program of innovative research should not be reduced in order to fund another program of research.

It is worthy of concern that while SBIR programs will be operated by the various agencies using appropriations made to those agencies, as the proposed legislation was conceived, agencies would seek applicants for awards according to a schedule determined by the SBA, and conduct the SBIR programs in accordance with regulations issued by the Office of Federal Procurement Policy working together with SBA. Further, each agency would be required to report to SBA on the number of awards made over $10,000 each year. Since the program was designed to aid small business, the above is understandable, but it does raise questions over the control of research in research-intensive agencies by a well meaning agency that has little or no experience in the administration of research programs.

The pending legislation H.R.4326 treats every federal agency's research program identically, although we know that both research and administrative ecologies of agencies and research programs differ. Since the NSF program has established itself, it would seem prudent to consider the possibility of creating unique programs in the appropriate participating government agencies instead of mandating identical - but possibly incongruent SBIR programs.

No invidious comparisons can be made with the NSF SBIR program. Its funds have been allocated to it not arbitrarily as a percentage of some other larger fund, but determined in absolute terms for the program's inherent value. It is a fact that a large percentage of approved research proposals are not funded by NSF for lack of funds. This shortfall of funds in no way can be held against the SBIR program's funds, determined by Congress as being of equal value.

Were this committee to establish in law an SBIR program in every agency within its jurisdiction, and other authorization committees would do likewise, the fundamental objectives of the pending legislation could be achieved without raising much of the concern we bring before you today. Such changes as would be deemed necessary in the program in one agency and not the other would be made under the authority of the appropriate committee, and funding levels likewise would be determined through the authorization and appropriation process. Funding levels within the agencies could be the same as H.R.4326 proposes, or less or more as determined by the Congress.

The Administration's Views on the Proposed Legislation

Mr. Chairman, we understand that it is a political world that we live in, and many considerations must be taken into account by a government's officials in determining policy. We understand, therefore, that the Administration had reasons for deciding, in late September, after it had testified before the House Committee on Small Business against the proposals in the pending legislation, that it would support the legislation. Still, the Administration's testimony is on the record and it provides some insights into the several serious shortcomings of H.R.4326.

The Administration correctly noted that the bill confuses objectives, that of the government's need for results through its R&D programs and that of assisting small business. The Administration raised questions about the arbitrary fixed percentage in the statutory set-aside which reduces agencies' flexibility in fulfilling R&D missions. The testimony observed, too, that the funds for the SBIR's were authorized by Congress for one purpose and the new law would create a diversion of these funds from that purpose.

The Administration's testimony also worried over the possibility that the percentage set-aside could multiply several times if applied to only a certain portion of the R&D funds of the agency, even if all R&D funds were used as the base to determine the amount of funds that constitute the quota. The Administration argued that the bill's intention was to stimulate small business innovation. Therefore, only those funds allocated for extramural applied research and development should comprise the base for the program. Funds for fundamental science, science education and research training, intramural research, and other portions of the agencies' R&D budgets should not be used. The result would be a major taxation of extramural applied R&D funds. The Administration assumes exclusion of basic research. We applaud that assumption, because if it is inaccurate our concern remains that it will be basic research that would suffer the most.

Of equal interest is an October 2nd communication by the Secretary of the Department of Health and Human Services to the Director of the Office of Management and Budget. It cites opinions by the Veterans Administration and the Treasury Department that oppose the legislation because of its set-aside requirements. It stresses - as we do - support for the intention of the proposed legislation, but expresses concerns over the manner in which the percentage set-aside and the three-phase structure of the SBIR model would operate.

The Secretary, naturally, concentrates on research within HHS, primarily at NIH. He notes the contradiction of trying to fulfill the direction of Congress to stabilize investigator-initiated research at a level of 5,000 grants annually in a period of fiscal stringency and setting aside a percentage of those dollars for another purpose. He worries, too, about the possibility that research scholars, facing increasingly intense competition, and being turned down with high scores that available federal funds cannot reach, will incorporate themselves as small businesses to obtain funding in a program where funds are protected through the set-aside mechanism.

We have begun dealing with the new complexities inherent in the relationships developing between universities and high technology companies. Our experience tells us that the sensitive systems of university research can be upset by a variety of influences oriented toward goals different from the traditional quest of university research laboratories. We think there is good reason to be concerned. If basic research dollars are diverted, they may divert scholars from the university environment with the attendant loss of collegial relationships, supervised training of graduate students, and the free exchange of ideas. If faculty members move away from the campus it would destroy a precious resource for the United States.

What is most important is the general statement of the Administration - the idea has validity, there is much that can be and should be done and much that has been done to enhance the capacity of small business to attract federal dollars for R&D work. But the legislation before you is seriously imperfect and needs modification. From our perspective, an assured protection of basic research funds in each agency from diversion is one such imperative correction required.

Summary

Mr. Chairman, and members of the Committee, we would summarize our views as follows. As representatives of the academic research community, our central concern with the Small Business Innovation Research legislation is with its potential impact on the conduct of basic research. We think that all sectors of American society conversant with it would agree to the significance of the fundamental study done in the sciences and its necessity for the future strength of the nation's economy, national security, and general wellbeing. Although it forms the basis for all the applied research and development that follows, basic research comprises a relatively small portion of the federal government's total cost for R&D - about $5.5 billion annually, or less than 15% of the total. By design, and with a record that suggests wisdom, the nation has situated most basic research activities on university campuses where inquiries into new knowledge find a receptive home. This enables our institutions to carry out the training of young scientists and engineers as basic research is conducted.

The set-aside proposed in H.R.4326 will prove inimical to basic research since funds from basic research will be transferred to SBIR's, which, almost entirely, will not involve basic research. Given the already seriously restricted budgets for basic research, there would be inevitable loss in progress and people in many key sciences. Because of their long-term commitments to development projects, we fear that agencies will feel compelled to protect those projects at the expense of basic research, from which much more than a small percentage may be taken to meet the new laws requirements. Even if amendments such as the Schmitt amendment were to be in the final law, and even if agencies were somehow prohibited from reprogramming basic research funds, the loss still would be a specific percentage of dollars from basic research support. Since the most important benefits occur at the margins of support, the loss of that one percent or three percent will be far more significant than the percentage figure suggests.

If Congress wishes to enhance the capacity of those small businesses engaged in high technology who need federal assistance to do inventive research and development, the model to follow is the NSF's SBIR program, adapted to the functions and operations of other agencies.

Congress may feel a necessity to proceed with H.R.4326, but amending it to protect basic research. The variations in the agencies obviates success of using a simple formula. Reasonable protection, in our opinion, requires, 1) exempting NIH from the bill's coverage, 2) maintaining the NSF's SBIR in that agency under this committee's - not SBA's - monitoring 3) eliminating basic research - "phase A" - from the tax base, and adding language to the bill that mandates that no funds appropriated by the Congress and intended for basic research be expended on SBIR's.

These three steps would go a long way toward preventing the harm to basic research that so concerns our community.

Mr. Chairman, in behalf of the membership of my association, I thank you for the opportunity to present our views to your committee. I will be pleased to attempt to respond to your questions.

Mr. **Walgren**. Thank you very much, Dr. Marston.

Mr. Fuqua?

Mr. **Fuqua**. Thank you very much.

I want to thank our three witnesses for their testimony and the concerns you have expressed of the probable impact this may have on basic research as in the normal fashion conducted by the Government.

Yesterday the administration testified in support of the Senate bill, but not in support of the House bill. I was wondering if your thoughts would be that the Senate bill would be more preferable than the House bill, without the recommendations that you have made.

Mr. **Marston**. You heard a little less about the Senate bill than the House bill. It has an amendment that has in it some advantages, but as we testified today, we do not feel this amendment gives adequate protection to carry out the intentions that we and others in discussing the possible damage to basic research expressed in the Senate bill.

Dr. Kennedy, you spoke eloquently on this question of how you decide a little hurt is that much worse than more hurt.

Mr. **Kennedy**. Yes, all sorts of metaphors occur to one, Mr. Fuqua. I like the difference between the two broken legs and one.

Mr. **Fuqua**. You mentioned excluding NIH because of the special nature of biomedical research and also NSF because it already has a program. How have you found the program in NSF working? This was an affirmative action program to try to get more small business involved.

Senator Kennedy testified yesterday, and of course he has been probably one of the prime movers of that portion in the NSF bill. How, in your opinion, has that worked? Has it had any detrimental effect to basic research?

Mr. **Kennedy**. I do not believe it has. I think it is a program that is too young to judge. I have asked a number of people, as this legislation moved through the Senate and then over here, for their evaluations of it. I get mixed predictions about whether it is really going to turn out to be a significant benefit or not.

That is a question, however, I would urge you very strongly to ask of tomorrow's witnesses, who come from high technology industry. I think that the most creative and most vigorous small companies that are the proposed beneficiaries of this legislation are exactly the people who ought to be providing the responses to that question.

I would not invite you to be asking it if I didn't have the strong suspicion that some of them at least will answer, "We don't go through that, and the reason we don't go through that is because the ideas that we have that are really good are attractive to venture capital, and we don't have to fill out so many forms for that."

Mr. **Fuqua**. The Senate adopted an amendment by Senator Schmitt from New Mexico that attempts to clarify basic research. How would you view that amendment? Is it satisfactory or does it need more clarification?

Mr. **Marston**. It is a movement in the right direction, Congressman Fuqua. I think you run into a real problem in an agency like NIH. Certainly I would have had great difficulty as director in drawing a sharp line between basic research and some of the clinical trials.

I think Dr. Oliver got into this in the testimony. You may want to expand on this.

Dr. OLIVER. I think it is particularly difficult in the biomedical and behavioral research institutes, ADAMHA and NIH, because they don't differentiate. In fact, it is exceedingly difficult to differentiate between basic research and applied research. It is less difficult about developmental aspects.

I think it would be almost impossible for the NIH to draw the line and, therefore, the Schmitt amendment simply doesn't apply in biomedical and behavioral research.

Mr. MARSTON. Mr. Chairman, I think that is a significant problem with this bill in that it lumps together with a similar mechanism very, very dissimilar activities of the Federal Government. I really don't think you can do that and have it work.

That is the reason we put the stress on some of the alternatives of putting the responsibility back with the appropriate committees who spend their time understanding the substance of the programs rather than having a single process that tries to treat things as different as DOD and the National Science Foundation.

Mr. FUQUA. In the consensus recommendations that the three organizations that you represent present to us, you mention in No. 4 it would probably be better for the authorizing committees to review that on an individual—not review, but not try to address the problem on an individual authorization basis, agency by agency.

Could you elaborate further on that?

Mr. MARSTON. Well, it is against the background that we do think that this bill as it now stands is not going to work. For the reasons that we pointed out here we think that evidence of problems is likely to occur very early in its history. Therefore, the authorizing and appropriations committees should look at the agencies, look at their missions and check on progress. You may find, for instance, that the best of small businesses are not interested in a program of this type? One should be able to know the answer to this question promptly (in fact, there is some evidence I suspect now in terms of applications before the National Science Foundation). One should be able to get some sense of whether there is a dividing line between the leaders in the high technology small business and those less innovative.

Will this program attract primarily unsuccessful applicants in the peer review process of the National Science Foundation? I think that would be information that would be useful to a committee such as this that spends so much time with the National Science Foundation budget.

We have stressed the great differences between basic research and innovation. One might know within 6 months or 1 year or 1½ years whether, in fact, funds that you thought were going into basic research were, in fact, going into innovation.

I believe problems of this type are going to emerge and emerge early. The Nation and the Congress should be in a position to detect this early on and not come along some years down the road and say, "We wish we knew things would not work out the way we planned."

Mr. FUQUA. It has been suggested that there be a 2-year review should this be enacted. Others have suggested maybe that was too short a time. Maybe it should be a 4-year time.

What are your thoughts about the length of time before review to see if it is working or what the impediments may be to its successful implementation?

Mr. MARSTON. We talked together this morning about the recommendation you heard yesterday, that 2 years might be too short and that 4 years was more appropriate.

I am of the mind that it would be much wiser, especially for the Science and Technology Committee, as well as others with your type of responsibility, to stay on top of this program from the beginning.

I am not talking about the initial problems that one has with all new programs in putting out significant amounts of money, but I am talking about the basic goals of this legislation, which are being handled in a new and different way from anything that has been done in the Federal Government, to my knowledge.

Mr. KENNEDY. If I could just add something, I think who is just as important as when, and I think it is terribly important for those committees of the Congress whose responsibility it is to assess the health of our country's research effort to be continuously involved in monitoring, whether this legislation really makes the contribution to it that its advocates hope it will.

Mr. FUQUA. Thank you, Mr. Chairman.

Mr. WALGREN. Thank you, Mr. Chairman.

Mr. Gore?

Mr. GORE. Thank you.

I would like to thank our witnesses this morning for their very eloquent statements. Of course, I have been aware of the concerns of the university community about this proposed legislation. It is partly because of those concerns that I intend to offer amendments that will in essence conform the House bill to the Senate bill.

I take it from your metaphor, Dr. Kennedy, that you do in fact prefer one broken leg to two broken legs, is that fair to say?

Mr. KENNEDY. Yes, sir. It is, however, the mildest of preferences.

Mr. GORE. I would also like to thank you on the record, Dr. Kennedy, for the assistance you have given the subcommittee I chair on a couple of other projects we have pursued over the past year, and hope to pursue this year. I appreciate it very much.

I was interested in your statement. You talked on page 8 about the quantification of the amount of money that small business actually gets. I was operating under the assumption that small business is actually almost shut out of R. & D. money.

You don't mean to challenge that assumption, do you?

Mr. KENNEDY. It depends, Mr. Gore, on which end of the problem you take first. If you ask the question, where does Federal R. & D. money wind up, then 4 percent is a very serious understatement.

Mr. GORE. You include in your analysis the laundry bill for the laboratory coats going to small business to clean the lab coats, don't you?

Mr. KENNEDY. In the top paragraph of page 8 it is correct that we are talking about procurements other than strictly R. & D. procurements, but they are nevertheless procurements performed with dollars that originate from the Federal research and development budget, so if what you are trying to do is describe the destinations of those dollars, then you have to use a much larger number than 4 percent.

Mr. GORE. But the purpose of the legislation is not simply to direct money to small businesses. If that were the case, then we could look at these other figures. That is sort of a supply side approach to getting the money to the small business subcontractors.

The purpose is not just that. The purpose is to allow the Nation to take advantage of the perceived energy and productivity and advantages that often appear in small business operations of the kind that we looked at in hearings earlier—well, last year—that often come out with startling new discoveries.

Mr. KENNEDY. I quite agree. I am merely pointing out that 4 percent applies only to prime contracts. The flow figures that one can get simply because they are available under the reporting system of Public Law 95-507 or other means show you something else. They show the ultimate destinations of those dollars.

The point is, there are a number of research type subcontracts that would be made by prime contractors that would certainly challenge the innovative capacity and creativity of subcontracting performers and that haven't been calculated when that 4 percent figure was developed.

As far as I know, it hasn't. We feel these are very, very squishy numbers, and I think proponents owe us a more careful accounting of exactly where the dollars are going.

Mr. GORE. You have reason to believe there are in fact a lot of R. & D. subcontracts to small businesses?

Mr. KENNEDY. I have no reason to attach a particular number to it. I don't know whether it would be a lot or a few, but I surely think it is important that we know.

Mr. GORE. I can't disagree with that, but I haven't seen much evidence to make me believe that there are a lot of those, but we will look for them.

Mr. WALGREN. Would the gentleman yield at this point?

Mr. GORE. Yes.

Mr. WALGREN. I am approaching this really from the standpoint of a first impression without any knowledge in the area, but it strikes me that the number may be a lot. The ironic thing is that if it is a significant percentage, even above 10 percent, let's say, that would be effective in this area, you are taking 10 percent of almost the whole ball of wax. So, the participation of small business in that view would be relatively substantial.

That brings the question up, then, what do you really want to set as a target for the participation of small business. Just on first impression, it seems that the numbers aren't only squishy, but they are nonexistent, and it is awfully hard to legislate in an area where you have absolutely no idea what the number is.

That is just a comment.

Mr. KENNEDY. If I may, I would like to call your attention to some other sources of data.

The Federal Procurement Data System reports Federal small business R. & D. contract actions over $10,000 by executive departments and agencies and that, if you aggregate them over the whole Government, yields a 6.8 percent of total agency budget figure and for some of the most active agencies yields impressively high numbers.

I will give this to you.

Mr. **Gore**. I would like to have that.

Let me ask you about something you know about. How much of Stanford's research and development money was spent with small businesses for research and development subcontracts?

Mr. **Kennedy**. Our reporting system under Public Law 95-507 doesn't immediately break out whether the dollars were for contracts that you and I would describe as R. & D. contracts or whether, for example, it represented the purchase of a piece of equipment that was only slightly modified for the purpose of that experiment.

If SLAC goes out and buys from a small firm a machine that is enough modified so that it is almost custom made, do you call that a R. & D. subcontract or not? It is awfully close.

I don't think all of these calls are going to be easy, and that is why I think it needs some work.

Mr. **Gore**. Can you think of an example of the pure R. & D. subcontractor that Stanford has granted to a small business?

Mr. **Kennedy**. I haven't looked over the SLAC data, so I couldn't pick out a particular firm.

Mr. **Gore**. There is not one that springs to mind?

Mr. **Kennedy**. Yes, but that is a level of analysis, Mr. Gore, that I seldom engage in. I will be happy to supply it for the record.

Mr. **Gore**. We will hold the record open.

[The information follows:]

Two of the small businesses Stanford University has contracted with to perform what could be characterized as "pure R&D" work on its prime federal research contracts are as follows:

1. Deacon Research of Sunnyvale, California under a $28,000 contract to: (1) carry out various measurements of a storage ring laser; (2) carry out the design, assembly and testing of measurement systems necessary for laser measurements; and (3) analyze the data obtained from these measurements, as part of Stanford's prime contract with the US Air Force to study the characteristics of an ultraviolet storage ring laser.

2. Geothermax, Inc. of Berkeley, California under a $131,348 contract to serve as the engineering evaluator of Stanford's field pilot project on improving oil recovery for the Department of Energy.

In addition, Stanford University regularly contracts with small businesses for the purchase of highly specialized equipment for work performed under prime R&D contracts with the federal government. These contracts, although not always R&D per se, necessarily involve large elements of R&D.

1. For example, Stanford has contracted with Optical Instrument Design of Virginia under a $10,000 contract for the design and fabrication of parts for a gyrotelescope model assembly as part of its prime contract with NASA to test Einstein's general theory of relativity.

2. SLAC has contracted with the following small business firms, among others, for its specialized requirements related to high energy physics experimentation under its prime contract with DOE:

Nanometric Systems, Inc. of Oak Park, Illinois under two contracts totaling $98,932 for a specially designed proportional wire chamber detector and related electronics;

A.I. Grazel, Inc. of Waltham, Mass. under a $157,000 contract for specially designed microwave multipliers;

LeCroy Research Systems of Palo Alto, Ca. under a $44,432 contract for CAMUC modules;

Joerger Enterprises, Inc. of East Northport, NY under a $2,700 contract for a CAMUC module.

Mr. WALGREN. Dr. Kennedy, you referred to a chart. I wonder whether that, too, should be made a part of the record, if there is a factual display.

Mr. GORE. I think that would be good.

[The information follows:]

FISCAL YEAR 1980
YEAR-TO-DATE
SPECIAL ANALYSIS 4.58

FEDERAL PROCUREMENT DATA SYSTEM

FEDERAL SMALL BUSINESS RCD CONTRACT ACTIONS OVER $10,000
BY EXECUTIVE DEPARTMENT AND AGENCY

	TOTAL AGENCY RCD		SMALL BUSINESS RCD		SMALL BUSINESS RCD	
	NO. OF CONTRACTS	$ (000)	NO. OF CONTRACTS	% OF TOTAL AGENCY	$ (000)	% OF TOTAL AGENCY
TOTAL FEDERAL	37,366	14,160,730	8,805	23.6	963,278	6.8
EXECUTIVE OFFICE OF THE PRESIDENT	0	0	0	.0	0	.0
DEPARTMENT OF AGRICULTURE	98	4,403	74	75.5	2,882	65.5
DEPARTMENT OF COMMERCE	41	2,618	6	14.6	476	18.2
DEPARTMENT OF DEFENSE	22,911	9,290,376	5,127	22.4	575,243	6.2
DEPARTMENT OF EDUCATION	0	0	0	.0	0	.0
DEPARTMENT OF ENERGY	2,583	1,337,827	620	24.0	101,469	7.5
DEPT OF HEALTH AND HUMAN SERVICES	2,238	526,778	241	10.8	46,865	8.9
DEPT OF HOUSING AND URBAN DEVELOPMENT	201	30,110	49	24.4	933	3.1
DEPARTMENT OF INTERIOR	910	128,196	230	25.3	28,898	22.5
DEPARTMENT OF JUSTICE	10	1,539	2	20.0	289	18.8
DEPARTMENT OF LABOR	25	9,288	10	40.0	989	10.6
DEPARTMENT OF STATE	44	1,451	24	54.5	697	48.0
DEPARTMENT OF TRANSPORTATION	1,440	146,397	689	47.8	55,796	38.1
DEPARTMENT OF TREASURY	0	0	0	.0	0	.0
ACTION	0	0	0	.0	0	.0
ADMINISTRATIVE CONFERENCE OF THE U S	0	0	0	.0	0	.0
AGENCY FOR INTERNATIONAL DEVELOPMENT	12	1,677	0	.0	0	.0
AMERICAN BATTLE MONUMENTS COMMISSION	0	0	0	.0	0	.0
BOARD FOR INTERNATIONAL BROADCASTING	0	0	0	.0	0	.0
CIVIL AERONAUTICS BOARD	0	0	0	.0	0	.0
COMMISSION ON CIVIL RIGHTS	1	25	0	.0	0	.0
COMMODITY FUTURES TRADING COMMISSION	0	0	0	.0	0	.0
COMMUNITY SERVICES ADMINISTRATION	0	0	0	.0	0	.0
CONSUMER PRODUCTS SAFETY COMMISSION	19	1,915	4	21.1	316	16.5
ENVIRONMENTAL PROTECTION AGENCY	1,609	226,449	664	41.3	87,215	38.5
EQUAL EMPLOYMENT OPPORTUNITY COMMISSION	0	0	0	.0	0	.0
FEDERAL COMMUNICATIONS COMMISSION	0	0	0	.0	0	.0
FEDERAL ELECTION COMMISSION	0	0	0	.0	0	.0
FEDERAL EMERGENCY MANAGEMENT AGENCY	179	13,804	38	21.2	2,658	19.3
FEDERAL MARITIME COMMISSION	0	0	0	.0	0	.0
FEDERAL MEDIATION & CONCILIATION SERVICE	0	0	0	.0	0	.0
FEDERAL MINE SAFETY & HEALTH REVIEW COMM	0	0	0	.0	0	.0
FEDERAL TRADE COMMISSION	0	0	0	.0	0	.0
GENERAL SERVICES ADMINISTRATION	1	16	1	100.0	16	100.0
INTERNATIONAL COMMUNICATIONS AGENCY	0	0	0	.0	0	.0

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FEDERAL PROCUREMENT DATA SYSTEM

FEDERAL SMALL BUSINESS R&D CONTRACT ACTIONS OVER $10,000
BY EXECUTIVE DEPARTMENT AND AGENCY

	TOTAL AGENCY R&D NO. OF CONTRACTS	TOTAL AGENCY R&D $ (000)	SMALL BUSINESS R&D NO. OF CONTRACTS	SMALL BUSINESS R&D % OF TOTAL AGENCY	SMALL BUSINESS R&D $ (000)	SMALL BUSINESS R&D % OF TOTAL AGENCY
INTERNATIONAL TRADE COMMISSION	0	0	0	.0	0	.0
INTERSTATE COMMERCE COMMISSION	0	0	0	.0	0	.0
MERIT SYSTEMS PROTECTION BOARD	0	0	0	.0	0	.0
NATIONAL AERONAUTICS & SPACE ADMIN	4,889	2,386,431	976	20.0	55,872	2.3
NATIONAL CAPITAL PLANNING COMMISSION	1	14	1	100.0	14	100.0
NATIONAL ENDOWMENT FOR THE ARTS	0	0	0	.0	0	.0
NATIONAL ENDOWMENT FOR THE HUMANITIES	0	0	0	.0	0	.0
NATIONAL GALLERY OF ART	0	0	0	.0	0	.0
NATIONAL LABOR RELATIONS BOARD	0	0	0	.0	0	.0
NATIONAL MEDIATION BOARD	0	0	0	.0	0	.0
NATIONAL SCIENCE FOUNDATION	27	41,093	3	11.1	148	.4
NATIONAL TRANSPORTATION SAFETY BOARD	0	0	0	.0	0	.0
NUCLEAR REGULATORY COMMISSION	14	1,787	6	42.9	729	40.8
OCCUPATIONAL SAFETY & HEALTH REVIEW COMM	0	0	0	.0	0	.0
OFFICE OF PERSONNEL MANAGEMENT	1	455	0	.0	0	.0
PENNSYLVANIA AVENUE DEVELOPMENT CORP	0	0	0	.0	0	.0
RAILROAD RETIREMENT BOARD	0	0	0	.0	0	.0
SECURITIES EXCHANGE COMMISSION	0	0	0	.0	0	.0
SELECTIVE SERVICE SYSTEM	0	0	0	.0	0	.0
SMALL BUSINESS ADMINISTRATION	0	0	0	.0	0	.0
SMITHSONIAN INSTITUTION	0	0	0	.0	0	.0
TENNESSEE VALLEY AUTHORITY	18	1,812	1	5.6	14	.8
US ARMS CONTROL & DISARMAMENTS AGENCY	39	2,666	15	38.5	847	31.8
VETERANS ADMINISTRATION	55	3,603	24	43.6	918	25.5
WATER RESOURCES COUNCIL	0	0	0	.0	0	.0

Mr. GORE. Since you mentioned the subject of instrumentation, I think that is a good example of the kind of thing that small business R. & D. can come up with that we already know about. A quantum advance in instrument capability, for example, can greatly aid research.

I am sure you are familiar with the examples of that, and I am sure you also agree small high technology firms have made many of the advances in this area.

Mr. KENNEDY. They have, indeed.

Mr. GORE. And presumably if they had the opportunity to come up with proposals on their own for R. & D. work for further improvement, then we might be able to take advantage of the opportunities that only they see from their vantage point.

Mr. KENNEDY. That may be true, Mr. Gore, but I don't think it follows inevitably from the first statement.

Because small businesses have been responsible for many important advances in instrumentation it does not follow that a new program to benefit them will produce more. On the contrary, it could be that the good ideas are being funded in the venture capital markets and that not-so-good ideas are not.

In short, if we are to prove that this is not just a solution in search of a problem, it seems to me that we need to ask the people who are most critically involved in high technology innovation to see whether those sources are adequate.

It is in exactly that spirit that I urge you to put these questions to tomorrow's panel.

Mr. GORE. We did that in the subcommittee last year, and we had 2 full days with leading scientists, innovators, and asked them at some length about their access to the funds. They have real problems.

The Stanford relationship with small, high technology firms is, I am sure you are aware, relatively unusual around the country, wouldn't you agree? I mean, you have been successful in a way that most universities have not.

Mr. KENNEDY. I don't think it is really we. I think it is a combination of young companies with good ideas and a venture capital market that has suddenly become much more active and much more adequate.

I would emphasize that you have to take the data point right now, and not even a year ago. In the middle seventies, the amount of venture capital available annually for young companies sank to a low of $75 million. This last year it was $1.2 billion. The growth was enormous and resulted from the changes in capital gains tax laws, the Congress passed for that particular purpose.

You are in the middle of an extraordinary experiment in funding innovation, and one of the arguments I think you will hear tomorrow is that that experiment is going so well that it raises serious questions about whether you need another.

Mr. GORE. Then at the same time you see what the Japanese are doing and what the French announced in the newspaper this morning in the computer area. You see how even in Silicon Valley, with the rapid progress there, the competition from overseas is just devastating.

Fortune reports that the race for the memory market is already over as soon as it has begun, and we have lost. I don't think we are in danger of overdoing our efforts in this area. I hope that I am wrong.

Mr. **Marston**. To speak for another part of the country, I seldom have a week that goes by that some small company doesn't come into my office, never asking me for anything except for the opportunity to work with our faculty.

This week is no exception. The company has found the funds they need, but they would like to have an exchange with our faculty. We are in the process now, as is happening all over the country, of meeting part of this need through the establishment of a research and technology campus, to meet the needs in medicine and engineering and in the other areas.

Mr. **Gore**. In fact, that is a related subject that the Investigations and Oversight Committee is exploring in some depth. Dr. Kennedy testified earlier, and we are working jointly, meeting with the AAU next Monday on a project to pursue this in some length.

The dividing lines between institutions in our society are being changed in banks and savings and loans and, in this case, universities and corporations. I think it might be healther if we can get more research and development activity in the smaller corporations rather than relying on this burgeoning alliance between the university research departments and large companies.

As I say, that is a related topic.

Dr. Marston, you use an interesting word—or maybe it is just a metaphor—when you talk about taxation in your statement. You talk about the 1 percent tax. That is an interesting way of looking at this.

Is that the way you see it, that it would be a tax on the money that the Federal Government gives to the universities?

Mr. **Marston**. In the sense that as I look at the present proposal here and as it has been discussed by members of this committee, it seems to me that a perceived need, essentially unrelated to the Federal Government's basic research programs, is looking around for some money.

It looks into basic research and doesn't hesitate to design a program and fund it, but says let's take a percentage, in that sense, from something that is going on over here and put it into something that is quite different.

It again comes back to that significant difference between basic research and innovation. I suppose it is a 1 percent tax on basic research, yes. I guess I would stick with that.

Mr. **Gore**. It sort of makes it seem like universities are owed that and it is unfair to use it for any other purpose.

Mr. **Marston**. Let me be very sure on that one. For many years, while I was Director of NIH, I was a strong advocate for a change in the patent laws to allow business to come in and compete. I support good research where it is occurring, and I think one has to do that.

I think if we deviate very far from quality as the main determination of award we are in trouble. Thus, I have argued again the distribution of research funds on the basis of geography or on the basis of the type of institution. I think when you are talking about serious basic research, once you move just a little ways off of funding the best and seeking the best, you are in real trouble.

Mr. **Gore**. Well, Dr. Marston, when you make a statement like that, I pay attention because I know your record and your country is in a lot better shape today because of your service and that of the other panelists. Dr. Kennedy, I am certainly going to say the same thing about your service in government. We are all in debt to you all.

I frankly think that this bill has a lot of momentum behind it, but we have got to take your concerns into consideration.

I am going to offer four amendments to try to make it better and better, I think, from your perspective. Frankly, I think some of the other concerns you have raised we ought to take a close look at, also.

I appreciate the testimony I have heard today.

Mr. **Walgren**. Thank you, Mr. Gore.

Mr. **Winn**. Thank you, Mr. Chairman.

Thank you, Mr. Chairman.

In the interest of time I will ask unanimous consent that I be permitted to submit my questions in writing to the distinguished panel members.

I have enjoyed this discussion and hearing the remarks of the witnesses. It is very impressive.

I would like to point out for the record, and for anyone else who is interested, these gentlemen are appearing representing their various associations and not their own individual universities. I say that because we have had requests from other universities that wanted to be heard, and it is my understanding that the record will be kept open for some time so that other universities might present their side of the story.

The reason you gentlemen were selected, of course, is you represent these three very fine organizations.

I would like to say, Dr. Marston, on your number four of your consensus recommendations, I think that has a lot of merit. I am sure that you would rather have one, two and three prior to that, but we are not debating the issue on one, two or three.

I do think number four has a lot of merit, and I think that is very constructive to the committee in our deliberations. I thank you very much.

I want to thank all of you for a very fine presentation.

Thank you, Mr. Chairman.

Mr. **Walgren**. Thank you, Mr. Winn.

I just had a couple of thoughts. In looking at the arguments that are made for this legislation, there were certain individual instances cited.

Dr. Marston, I understand that you were involved in one of the areas cited, that being the introduction of penicillin. The Small Business Committee report indicates that this was the direct outgrowth from an independent inventor and originated through a small business.

I wonder if you could comment on that, in view of your personal involvement in the area.

Mr. **Marston**. I was not involved in the development of penicillin, but I arrived in the laboratory in 1947 and worked daily with all of the individuals in the Oxford group that developed penicillin.

It is true that Fleming was a university professor when he made his observation. Twelve years later, the Oxford group, in part growing out of an interest in a weak antibacterial substance in human tears, decided to go back and re-examine the penicillin story. In that small university laboratory these full time faculty members developed penicillin to the point of production and of treating patients. At that time, they needed help.

It is to the credit of this Congress of the United States that when Florey Heatley and others came over under wartime conditions, that you responded, supported and helped bring together American industry, American government, and the university people to push further, at that time, with the development and mass production of penicillin.

That is the time that industry really got into it. Prior to that time the work was done in a very small laboratory at Oxford University.

It was very important to have American support then because that meant penicillin was available for the treatment of our soldiers in the North African campaign.

I would go further and say that from my reading, 7 of the 11 discoveries on the record were done in universities, 3 of the 11 in small business and 1 of the 11 really by an individual who essentially did it on his own.

So, I could use this same list as a very strong case of why it is important to keep basic research in the university where it has been carried out effectively. That is what I read from the evidence that was supplied to demonstrate the contributions of small businesses.

Mr. **Walgren**. I want to ask Dr. Kennedy, also, if he has any reactions with respect to the difficulty that small businesses have in securing Federal funding.

The testimony is that they don't want to grapple with the forms and the like and, therefore, they haven't obtained their fair share, compared to universities in particular. The universities are cited as having had some kind of special advantage in this area that has made them very successful.

Can you comment on that?

Mr. **Kennedy**. I can. I think some people have a different idea about how science is done in universities. Perhaps we contribute to it by picking sometimes examples of large science.

Most Government basic research dollars that are spent on fundamental research in universities are spent in laboratories supported on rather modest budgets, less than $100,000 a year, certainly, and often less than $50,000. They are laboratories in which less than a dozen people work. They are quite independent. The professors apply for research grants on their own.

Having lived that life for 25 years, Mr. Walgren, I can assure you it is like nothing else so much as a tiny little business. You do have to apply for funds, and you don't have a large university office to help you.

We have a project office which merely keeps files and, in response to Government requests, to aggregate information and to make sure university policies aren't violated. They don't fill out the forms for you. You do that all by yourself.

I want to tell you it is less complicated by far than filing your income tax return; I mean, a lot less complicted to apply for a National Science Foundation or a National Institutes of Health or DOD grant. I have had all three.

So, to argue there is something terribly mysterious and difficult about this process, that a business with 200 employees can't master it just isn't right because faculty members, sitting in their little cottage industries in the universities, apply for them all the time, and they haven't big staffs to help them.

Mr. **Walgren**. In your view there is no great advantage vis-a-vis small businesses?

Mr. **Kennedy**. Not with respect to the accessability of the regular research granting process. I don't think that is the case. I don't believe, either, that there is an old boy network that makes it more difficult for new players to come into the game.

I think that in biotechnology in particular we are seeing the first signs of the for-profit companies competing successfully for funds using that mechanism, and I think you are going to see more of it. All they have to do is to hire the people who have the ideas and the persuasiveness to compete effectively.

Right now about 5 percent of the Nation's scientists and engineers in research and development, are located in the small business sector. When that proportion changes, then I think that the success ratio will change.

Mr. **Walgren**. Dr. Oliver, you are raising the point of the logic behind excluding NIH and some other agencies. This gives me a thought. It is not exactly the same thing, but it is related to whether or not the attempt to protect basic research by an amendment such as has been enacted in the Senate, as I understand, which essentially prevents basic research from being raided disproportionately, would be effective.

You are recommending the set-aside at NIH. It raised in my mind the question of, if we set-aside basic research, could that truly be an effective protection for basic research inasmuch as it apparently is difficult to define the person?

The person doing the defining, as Dr. Tribus testified, would be a bureaucrat or somebody in the bureaucracy who may be very intent on protecting one political turf as opposed to another, and perhaps protecting applied research as opposed to a less influential basic research thrust, and would be in the position of making the definition or drawing the line between the two.

So, could the attempt to give us just one broken leg truly be effective in preventing us from winding up with two?

Dr. **Oliver**. We might slip with that and break our arms.

The Schmitt amendment was a thoughtful one for those agencies that very clearly can differentiate basic research from developmental application. However, it just simply cannot be done in biomedical or behavioral research. The blend is too soft to differentiate. I just think that the Schmitt amendment simply doesn't apply to those two institutions.

Mr. Walgren. Would it be your opinion that it is also difficult to distinguish in other areas beyond biomedical and behavioral between basic reserach and applied research, and would the definition of what to protect be well placed in the hands of somebody within the bureaucracy who may have a motive to preserve one category of finding or even one particular effort as opposed to another if he is forced to choose?

Dr. Oliver. I have to confess, Mr. Chairman, that my expertise is limited to the biomedical and behavioral area, but I think the suggestion you made makes very good sense to me. I would hate very much to have someone outside of the university making arbitrary decisions: this is basic research, this is applied, this is developmental.

Mr. Walgren. Are there other comments on the effect of the ability to protect basic research from suffering a disproporational share.

Mr. Marston. In DOD you have a category, the 6.1 category, which is basic research. I think we would share your concern that if that were protected and came in conflict with the high priority DOD development projects, some reclassification to protest the development projects could occur. The result could be additional decreases in basic research at the margin, and that would be unfortunate.

So, I think we share the concern that you express very well. I think we would be pleased to try to be more specific in terms of what type of protections one could have by having that amendment go further, if you would like for us to put our collective minds together on that.

Mr. Walgren. If there are any suggestions that might make it more effective, they would certainly be welcome because I know we are all concerned that basic research would be squeezed out because of the political power of the applied research arms, as it were.

Yet, it strikes me that if someone in the bureaucracy, with the intent that the previous witness testified, and how they are certainly able to carry out their own view with no effective way to alter a given decision anyway, if they are the ones doing the defining, basic research might find it is as much at risk with an amendment as without.

Mr. Marston. Conceivably.

Mr. Kennedy. That is the problem.

Mr. Walgren. On behalf of the committee, I would like to thank you for the testimony of this tremendously distinguished panel. We do appreciate your advice.

Mr. Marston. Thank you very much for the opportunity to be with you.

Mr. Walgren. The committee stands adjourned.

[Whereupon, at 12:50 p.m. the committee adjourned, subject to call of the Chair.]

SMALL BUSINESS INNOVATION DEVELOPMENT ACT

THURSDAY, JANUARY 28, 1982

House of Representatives,
Committee on Science and Technology,
Washington, D.C.

The committee met, pursuant to call, at 9:38 a.m., in room 2318, Rayburn House Office Building, Hon. Don Fuqua (chairman of the committee) presiding.

Mr. Fuqua. The committee will be in order.

As we continue the third day of our hearings on H.R. 4326, the Small Business Innovation and Development Act, we are very pleased today to have one of our distinguished colleagues from California, the Honorable Pete McCloskey, to not only make a statement, but I understand he desires to introduce a witness.

Pete, we are happy to have you and we are grateful to you for your interest in the legislation.

STATEMENTS OF HON PAUL N. McCLOSKEY, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA; EDWIN V. W. ZSCHAU, PRESIDENT, SYSTEM INDUSTRIES; HON. WILLIAM E. DANNEMEYER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA; AND RANDY KNAPP, PRESIDENT, CHIEF EXECUTIVE OFFICER, AND CHAIRMAN OF THE BOARD, WESPERCORP

Mr. McCloskey. Mr. Chairman, ordinarily a bill to support "small business" would earn our fervent support.

The Small Business Innovation Act (H.R. 4326), however, seeking to mandate an additional 3-percent set-aside of Federal research and development expenditures for small business, will be counterproductive.

The leading high-technology small business association opposes the bill.

The biggest problem for small business today is the multitude and complexity of Federal laws and regulations—and the number of accountants and lawyers needed to cope with them.

I might say every small business I have seen has difficulty competing with big business. The more you multiply the regulations, the set-asides, and the requirements that must be met in order to compete, small companies become increasingly disadvantaged because they need the same number of accountants and lawyers as the big businesses and they just can't do it with the overhead.

This bill, if enacted into law, will require additional forms, bureaucracy and regulatory expense, estimated to cost over $35 million per year by the Congressional Budget Office—the very things we have been successfully deleting from the Federal Government recently when we abolished the Renegotiation Board (an estimated $250 million per year) and Vinson-Trammell (an estimated $100 million per year) and in our efforts at deregulation.

The high-technology companies of the small business companies in this country are already receiving 6.8 percent of Federal R. & D. contracts. The primary trade association, the American Electronics Association [AEA], representing 1,800 companies, of which 80 percent are small businesses, have clearly said they don't want this legislation.

It is my pleasure to introduce to you Ed Zschau, former chairman of the American Electronics Association. Mr. Zschau has formerly testified before Congress in favor of rolling back capital gains rates (the Steiger amendment) on behalf of the AEA. Incidently, his testimony in 1978 was to the effect that the best thing you could do for small business was to make capital available.

In that year, 1977, as I recall, there was a very small amount, less than $50 million, available for small business investment.

The thrust of his testimony will be that as a result of the Steiger amendment, there is now over $1 billion going into these small, high-technology companies.

Ed also has testified for restoration of the restricted stock option, a proposal which attempted to get top executive talent to leave big companies such as IBM and United States Steel, and go to work for small, high-technology companies because of the increased value of the stock option.

That bill was included in the Economic Recovery Tax Act of 1981.

I have looked at the testimony of Warren Rudman, which somehow attacked the American Electronics Association on the belief that the governing board was composed of big businesses. They are not. AEA's Small Business Committee, composed entirely of small company presidents, drafted the AEA position.

It is my pleasure to present Ed Zschau at this time for his testimony.

Mr. FUQUA. Mr. Zschau, we are happy to hear from you. You may proceed with your testimony.

Mr. ZSCHAU. Thank you very much, Mr. Chairman. Good morning. Thank you very much, Pete, for that kind introduction.

I appreciate the opportunity to give my comments and perhaps some new information to this committee on H.R. 4326, but before I begin, I want to alert you to two biases that I have that shape my viewpoints on this bill.

First, I believe technological leadership should be a national priority for this country, but I also believe that you can't force technological innovation, you can only foster it.

Our experience has been that it is fostered best in an environment that has ample freedom and incentives for the researchers, the engineers, the entrepreneurs.

I had an opportunity to work in a small company, System Industries, where we tried to create that kind of environment. We find that it is most often present in small companies where there are freedom and incentives.

I have also worked at Bell Telephone Laboratories and the RAND Corp. I have been on the faculty at Harvard University and Stanford. Those institutions, though large, had freedom for the researchers that promoted innovation.

So I guess my point would be that the environment for innovation is the most important thing and the smallness of the organization, per se, is not what fosters innovation.

Second, I believe that Federal R. & D. expenditures should only fund those projects which are in the national interest and would not receive funding anyway. That is, I don't believe that the sources of funds from private industry should have to compete with Federal funds to fund the projects that private industry is willing to fund and able to fund. We should focus our scarce R. & D. dollars on those projects which would otherwise not be funded.

Senator Rudman has indicated to you in testimony this week that there are two major rationales for the bill. One is that there is a scarcity, he claims, of risk capital in this country and, second, that our small business R. & D. resources have been under utilized because of discriminatory practices.

I will focus my testimony on those two rationales and try to provide you with the data that I have collected concerning them.

I came to the Congress to testify in early 1978 about the scarcity of risk capital for small companies. My own company was forced to go to Japan to try to get some financing for technology because sources of risk capital had literally dried up.

I recommended at that time that a reduction in the capital gains tax be implemented by the Congress. Thanks to the leadership of the late Congressman Bill Steiger and Congressman Jones of Oklahoma, a lower capital gains tax was passed in 1978.

The results of that passage of the capital gains tax reduction have been extraordinary. If you refer to page 4 of my written testimony, I have some data which was collected by Stanley Pratt, who is publisher and editor of Venture Capital.

In that table, the first column indicates the amount of capital flowing into the venture capital firms in each of the years from 1969 through the present time.

You will notice up to the time of the passage of the reduction in the capital gains tax that the amount of money had dwindled, but in the most recent year, 1981, after that lower capital gains tax was passed, you will notice that there was $1.25 billion flowing from private sources, individuals, and pension funds into the venture capital firms. It has created a pool of about $5.8 billion of risk capital that is now available for young companies.

Correspondingly, the amount of money being invested in young companies has risen and in addition to that, the funds available from the public market have increased from a low of about $16 million per year in 1974 and 1975, to $1.76 billion last year.

My conclusion, from not only the data but also what is happening in the various areas that are spawning technology firms, is that the Congress has made a substantial solution to the problem of scarcity of risk capital.

In addition to that, further tax incentives that were instituted last year, such as a further reduction to the capital gains tax, restoring the restricted stock option, and instituting R. & D. tax credits, play an even greater role in bringing this capital forward.

In addition, we have found recently that there is a new phenomenon taking place, the phenomenon of R. & D. partnerships in which individuals group together specifically to fund R. & D. projects. They are able to write off the cost of the development as it occurs and then participate through a royalty scheme in the flows of revenue from the successful programs. This form of financing for young companies in R. & D. was not used until recently, but in 1981 about $175 million was invested in young companies from R. & D. partnerships, and it is estimated about $2.2 billion will be used, or invested in this form by 1990.

So my conclusion from all of this information and my own experience with the venture capital community and the other small businesses is that the incentives that were developed in 1978 and 1981 to unleash new risk capital have worked and that the capital scarcity problem has largely been solved in this country.

Small companies are once again getting financed.

The second rationale, whether or not the small companies are underutilized in doing R. & D. requires data analysis as well, and I know that in the committee report it is suggested small companies aren't getting their fair share of R. & D. contracts.

What I did to make my own assessment of whether that was true is to determine what fraction of technical resources—that is, scientists and engineers—reside in small companies.

I found from a survey of the National Science Foundation that 5.5 percent of the scientists and engineers in this country are employed in small companies.

I also went to the Federal Procurement Data Center to determine what fraction of R. & D. contracts outside of Government laboratories are received by small companies. I found that 6.8 percent of the Federal R. & D. contracts let by the Government for work in the private sector were obtained by small companies.

I, therefore, came to the conclusion that at least this data suggests, with 5.5 percent of the resources to do the work in small companies and those same companies receiving about 6.8 percent of the contracts, that at least the amount of utilization did not seem out of line compared to the larger companies.

Based on this data, I question the need for the legislation. I realize not every company is going to be financed and not every idea with possible merit will be funded, but I am not sure it is the responsibility of the Congress to try to make sure that every possible idea is funded or every possible small company is financed.

Therefore, I have concluded that the bill may not be necessary.

I have in my prepared testimony some other statements concerning what I believe would result if the bill were implemented, but I realize that the time is short, so I would like to thank the committee for its kind attention. I would be happy to answer any questions on my testimony.

[The prepared statement of Mr. Zschau follows:]

AN ASSESSMENT OF THE NEED FOR AND PROBABLE EFFECTIVENESS OF H.R. 4326

PAGES 7-9 CORRECTED

Statement of
Dr. Edwin V. W. Zschau
Chairman of the Board and President
System Industries, Inc.

before the
Committee on Science and Technology
U. S. House of Representatives

January 28, 1982

Mr. Chairman and Members of this distinguished Committee:

I'm Ed Zschau, Chairman of the Board and President of System Industries of Milpitas, California. System Industries, founded in 1968, is a manufacturer of large capacity data storage equipment for high performance minicomputers. We employ about 400 people in the United States, about 15% of whom are engaged in R&D activities.

Before founding System Industries, I was an Assistant Professor of Management Science in the Graduate School of Business at Stanford University and a Visiting Assistant Professor of Business Administration at Harvard University.

I appreciate the opportunity to appear before you this morning to offer my comments on H.R. 4326 and some information that may be helpful to you in assessing the need for this legislation and its probable effectiveness.

Mr. Chairman, before I begin I wish to advise the Committee of two biases I have concerning innovation and federal R&D programs which shape my viewpoint.

1) I believe that maintaining and extending the technological leadership of the United States should be a national priority, but we must understand that, by its very nature, innovation can't be forced; it can only be fostered. It is fostered by creating an environment that emphasizes freedom of scientific and industrial activities and that offers incentives to the innovators, entrepreneurs, and investors who have the talent and resources to advance technology. We've tried hard to create such an environment in System Industries. Such an environment is very often found in small companies. However, it's important to realize that it's the environment for innovation and not the size of the company per se that is important to fostering the innovative process.

2) I believe that government funding of R&D should be focused on those projects that would not otherwise be financed by private sources. These would include projects which are in the national interest but which have little or uncertain commercial application (e.g., space exploration or weapons systems) or projects which are of a long-range and basic research nature or those which require massive and specialized resources. I don't believe federal funds should be used to "crowd out" private capital. Clearly, government grants which are "free of charge" to the recipient are more attractive than private financings which require the company to sell stock or pay interest. However, I believe it is inappropriate to use taxpayers' money to compete with private sources to finance the projects that those private sources are willing and able to finance.

Over the past few years, I have testified several times before Congress on behalf of legislation which I felt would stimulate the starting up and growth of small businesses and promote technological innovation. I have also presented my recommendations in articles; a copy of my most recent article is attached as Appendix I. However, this morning I find myself appearing before you to express my concerns about H.R. 4326, my concerns that the legislation may not be necessary and that, if enacted in its present form, it could result in waste of scarce federal R&D funds and additional costs of administration. I hope you will understand that in offering this testimony I am not disputing the enormous contributions that small technology firms have made to innovation, but, rather, I am trying to encourage legislation which will create most efficiently a stimulative environment for such firms.

Over the past several weeks, I have gathered together information which I felt should be of interest to this Committee for evaluating H.R. 4326. My own study of that information has led me to the following conclusions:

- Recent changes in tax laws and new investment structures have generated in the past four years enormous amounts of new risk capital for starting up and growing small companies;
- Although definitive data is lacking, the participation of small companies in federal R&D programs appears to be in line with their resources to perform the work;
- The SBIR program applied government-wide on a mandated basis would probably result in misallocation of scarce R&D funds, costly overhead, and the crowding out of private capital sources.

I'll elaborate.

RECENT CHANGES HAVE GENERATED MUCH NEW RISK CAPITAL.

Nearly four years ago, I appeared before the Senate Select Committee on Small Business to document the shortage of risk capital for small businesses and to urge a sharp reduction in the capital gains tax on the grounds that it would rekindle incentives to invest in young companies and new technologies. Congress acted with initiative and foresight in 1978 and cut the maximum capital gains tax rate from 49% to 28%. The impact on the funds available for small business has been extraordinary

The following table summarizes the financing situation facing young companies in the 1970's before and after the tax change to the present time. (This information was collected and summarized by Stanley Pratt, Editor of Venture Capital Journal.)

Estimated Venture Capital Funding and Young Company Investments

(Millions of Dollars)

	New Private Capital Committed to Venture Capital Firms	Investments made by Venture Capital Firms in Young Companies	Funds Raised by Small Companies* from Public Market
1969	171	450	1,367
1970	97	350	375
1971	95	410	551
1972	62	425	896
1973	56	450	160
1974	57	350	16
1975	10	250	16
1976	50	300	145
1977	39	400	43
1978	570	550	89
1979	319**	1,000	183
1980	900	1,000	820
1981	1,250	1,200	1,760

*"Small Companies" defined to be those with a net worth of $5 million or less.

**The slowdown in funding in 1979 was caused by the Labor Department's Planned Asset Rule which discouraged pension funds from making venture capital investments. This was changed in 1980.

As the table indicates, the change in tax policy resulted in an enormous improvement in the funds available for young companies. There is currently a pool of about $5.8 billion available for investment by private venture capital firms, SBIC's, and corporate investment subsidiaries. Moreover, more of the money is flowing into start-ups. Mr. Pratt estimates that in 1978 only 20% of the investments of venture capital were start-ups, but in 1981, about 400 venture investments, 40% of the total, were in brand new companies.

But this doesn't tell the whole story. Last year Congress enacted three more tax changes that should provide additional benefits to innovative technology firms. The capital gains tax was lowered still further to 20%, "incentive stock options" were created to help small companies attract and motivate talented researchers and managers, and a 25% tax credit on increases in R&D expenditures was enacted. Although a minor change in the R&D tax credit is needed to make it more applicable to the start-up technology firms, these additional incentives should enhance still further the ability of innovative companies to obtain the human and financial resources they need to realize their potential--resources that were sorely lacking just four years ago.

In addition to the effect of tax law changes, there has been another phenomenon which is creating a new source of private funds for young R&D companies: The R&D Partnership. This investment structure permits individuals to provide funds for advanced R&D programs, write off the cost of the project against their personal income, and, in the event the project is successful, participate in its returns through a royalty arrangement. Before 1978, this structure was rarely used, but today it is becoming more common. At least $175 million was provided to technology companies last year through R&D Partnerships, and the Tax Shelter Insider (January 1982) estimates that $2.25 billion will be provided to R&D projects and technology firms in 1990 through this type of arrangement.

In short, changes in tax policy are already solving the problem of risk capital shortage that plagued small companies a few short years ago.

PARTICIPATION OF SMALL COMPANIES IN FEDERAL R&D APPEARS TO BE IN LINE WITH THEIR RESOURCES

A primary rationale for H.R. 4326 rests on the contention that the technical resources of small companies are being under-utilized by the federal government. The report on the bill states that small companies contribute half of this country's GNP but receive only 4% of the federal R&D funds. The report blames this disparity on structural and attitudinal discrimination in the contracting process which mandated set-asides would presumably overcome.

In assessing the extent of the under-utilization, it seems important to determine three statistics:

- What fraction of federal R&D expenditures is for work which small companies do not have the resources to do?
- What fraction of our total technological resources reside in small companies?
- What fraction of the R&D contract dollars actually go to small companies?

Proper utilization of small company technical resources would seem to exist if small companies received a fraction of R&D contract dollars (from contracts for which they were eligible) equal to their fraction of the total technical resources.

I was not able to get the first statistic. It would have been helpful in order to remove from the analysis the expenditures on federal R&D work that require specialized resources or equipment (e.g., a linear accelerator, a wind tunnel, a large-scale computer system) which small companies wouldn't possess. I understand that such information could be compiled from a composite report of the SBA Form 745 data but that the SBA does not produce such a report.

However, the later two statistics are available. They provide some interesting insight.

1) The National Science Foundation, using comprehensive national surveys, inventories the scientific manpower in the United States. Based on these surveys, NSF estimates that there are a total of 643,500 R&D scientists and engineers in the United States (in full time equivalents). Of those, 67,500 are employed in government laboratories with the remaining 576,000 employed in businesses, universities, university labs, and nonprofit institutions. Of the total private sector scientists and engineers, 31,900 or 5.5% are employed in small companies.

2) The Federal Procurement Data Center keeps records of all federal R&D contracts. The FPDC reports that 6.8% ($963,278,000) of the total money (prime contracts over $10,000) obligated by the federal executive departments and agencies for R&D during Fiscal Year 1980 ($14,160,730,000) went to small business.

My conclusion from these two statistics is that small business technical resources seem to be utilized in line with the technical resources from other sources: Small business has 5.5% of the R&D scientists and engineers and receives about 6.8% of the federal R&D contract dollars without even adjusting for R&D work which can't be done by small firms. I should emphasize, however, that the SBA and other agencies may have access to raw data that could help the committee make a more accurate assessment of this utilization issue.

A MANDATED, GOVERNMENT-WIDE SBIR PROGRAM WOULD PROBABLY BE WASTEFUL AND COSTLY

According to the NSF SBIR Program Office, the agency has funded 300 proposals with a total of $15.4 million over a period of more than 4 years and produced some fine results.

It helped with the financing of several research projects and companies which are continuing to grow and prosper today. However, the question is: Would this program with a mandate to spend $200 million in the first year growing to more than $1.5 billion per year in four years be an efficient use of our scarce federal R&D funds? I think not. Here are some reasons why.

1) H.R. 4326 would generate too much money to be allocated efficiently. Within a matter of a few years, this bill would require federal agencies to spend on small companies each year as much money as the total venture capital industry, which has developed over the past 20 years, invests today. I believe this would result in too much money being forced into the investment marketplace with the agency personnel being evaluated not just on the performance of the funded companies and their technical results but, importantly, on how well they met their mandated spending quotas. As we've seen again and again, such spending quotas are the wrong incentives for good resource allocation decisions. In that sort of a situation, a lot of "bad" deals would be funded, abuses would be encouraged (small companies--"beltway bandits"-- formed just to get some of these mandated expenditures), and private capital sources would be crowded out. Companies would apply for "free" federal funds rather than sell stock or pay interest to private sources. This has happened even in the modest NSF SBIR program, but the instances of unnecessary funding would be rampant in a government-wide program of the magnitude envisioned by H.R. 4326.

2) The SBIR program is too restrictive for government-wide application. The needs of technology projects and innovators vary depending on the field or research and the research objectives. Proper financing of such projects doesn't fit a narrow formula. Some of the most dramatic innovations have resulted from a simple, low-cost project while others required at the front-end large expenditures for apparatus and a long-term commitment. Although the three-phase SBIR program may be effective in many situations,

it would be inappropriate for funding technological innovation in many others.

3) Administering a government-wide SBIR program would result in expensive bureaucracy. Assuming that the NSF program statistics are representative of the parameters of a government-wide program, we can estimate the size of the administrative job required to implement this legislation. The average grant in the NSF program was $51,333. This suggests that in order to implement a government-wide SBIR program at just the initial $200 million (.5% set aside) level, more than 3,800 proposals would be funded. For reference, this is nearly 4 times the total number of investments that the entire venture capital industry in the United States made in 1981. That industry includes about 900 professional investors plus an equal number of support people.

By the time the full (3%) set-aside is allocated to the government-wide SBIR program, the federal government would be funding about 30,000 proposals per year. This would represent nearly one funded proposal for each R&D scientist and engineer currently in a small business! In order to administer such an incredible number of research proposals, the agencies would have to hire a massive number of contracting officers, make only cursory reviews of proposals and results, or both. The result would promise to be a combination of expensive bureaucratic buildup and waste of federal R&D funds.

In short, I believe a mandated, government-wide SBIR program would require spending too much money in a fashion that's too restrictive for efficient allocation of resources and, if properly managed, would result in an expensive administrative buildup. I don't think it would be an efficient use of our scarce R&D resources.

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When assessing H.R.4326, I urge the Committee to consider two fundamental issues:

- Is there a need today for this legislation?
- Would a program of small business R&D set-asides dispersed through a government-wide SBIR program be efficient?

I believe that the data I have presented this morning suggests that this legislation may no longer be needed, and a realistic assessment of the implementation of the program suggests that it may not be an efficient use of our scarce federal R&D funds.

Thank for your kind attention. I would be pleased to answer any questions you might have.

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Advancing Technological Innovation Through Tax Policy

Edwin V. W. Zschau

During 1981, the US Congress will formulate and enact a series of changes to the existing tax laws. Many factors will be considered in the process: the amount of tax revenue generated, the impact on various income groups, the effects on business activity, fairness, and the simplicity of implementation. The purpose of this paper is to make the case that there is another factor which should be considered when formulating tax policy in the 1980s: the impact of tax policy on the rate of technological innovation in the United States.

This case is based upon the following fundamentals:

- Leadership in technology is the most valuable national resource of the United States.
- US leadership in technology has been on a steady decline over the past 20 years.
- Fostering technology advancement requires both freedom and incentives for innovators.
- Tax policy is the most powerful instrument in the hands of the Federal government for fostering technological innovation.

Here are the specifics.

Technological Leadership — The Most Valuable Resource

The quality of life of American citizens depends upon having a strong economy that is able to produce an abundance of goods and services and also provide enough well-paying jobs. The US quality of life depends upon a strong national

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defense that makes any attack by foreign aggressors unthinkable. Technology is the key to both a strong economy and a strong defense.

The Economic Impact of Technology

- *Technological innovation is fundamental to economic growth.* The country is able to grow when it finds better, more efficient ways to do things and when it develops new products that meet unfulfilled consumer needs at home and abroad. Professor R. Solow of the Massachusetts Institute of Technology confirmed this in a study showing that approximately 80% of the growth in GNP of the United States between 1909 and 1949 was due to technical change; subsequent studies have reduced this number, but agree that it has been the single largest factor in such growth.
- *Technological innovation is fundamental to productivity improvements.* Through the ages, the physical capabilities of people have been enhanced by machinery, leaving more time for intellectual activities. More recently, the power of the human intellect has been extended by computers, data storage, communications systems, and visual display devices. Now the US is entering the age of robotics in which the two are combined to do certain work more effectively and efficiently than ever before. It's not surprising that a recent Brookings Institution study determined that more than one-half of the productivity increases in the United States between, 1948 and 1969 were the direct result of technological innovation.
- *Technological innovation is fundamental to international trade competitiveness.* In recent years, while the export performance of the United States has produced some disturbing trends with trade deficits of $26.5 billion in 1977, $28.4 billion in 1978, and $24.7 billion in 1979, exports of R&D-intensive products (*e.g.*, high technology electronics, capital equipment and pharmaceuticals) have shown excellent growth. From 1960 to 1979, R&D-intensive manufacturing industries increased their export surplus from $5.9 billion to $29.3 billion. During the same period, the trade balance of industries without technological bases declined from near zero to a negative $16.5 billion. With the country's trading partners recognizing the importance of innovation and technology, it is becoming even more important to emphasize technology advancement as the key to competitiveness at home and abroad.

The Need for Technology in Defense

If it is assumed that maintaining a parity in weapons with the Soviet Union is essential to a strong national defense, the country must rely on technology and its implementation in weapons systems as the basis for its defense strategy. Over the past decade, the Soviet Union has eroded much of the advantage that the US used to have by improving the power and accuracy of their strategic weapons and by increasing dramatically the amount of military equipment they produce. Although the situation is not yet desperate, the trends are frightening and need to be reversed immediately.

The trends can't be reversed by trying to regain numerical superiority. That approach would be financially unfeasible and ineffective. However, they can be reversed by using US technology, which in important areas is far more advanced than that of the Russians. The US has the technology to make munitions more accurate; aircraft, submarines, and missiles more difficult to detect; and surveillance and electronic warfare systems more effective. In the 1980s, US defense must be based on the use of *finesse* through technological innovation rather than on pure *force*.

US Technological Leadership Is Declining Badly

Over the past 20 years, US technological leadership has been seriously eroded. It hasn't been squandered, as some other resources have been through overuse and waste. It has been frittered away through neglect.

The emphasis on R&D in the US has been on a steady decline over the past two decades. In the 1960s, R&D expenditures grew about 6.5% per year, but in the 1970s the annual growth of R&D was only 1.6% annually. In fact, in constant (1972) dollars US R&D expenditures in 1977 were no more than they were in 1967.

In 1964, the US spent 3% of GNP on research and development, but by 1979 it spent only 2.2%. During a comparable period, two of its most aggressive trading partners — Japan and West Germany — were increasing their R&D expenditures. Table 1 compares the trends in these nations to those in the United States and provides data which suggests the economic implications of those trends.

Given the decline in R&D expenditures in the United States, it's not surprising that US leadership in technological contributions has declined as well. In the 1950s, the United States was credited with 80% of the major inventions made during that period. However, during the 1970s, its share of major inventions had dropped to 60%. In addition, from 1964 to 1979 the US patent balance, the percentage of US patents granted to US citizens, rather than foreign inventors, dropped from 88% to 62%.

TABLE 1. Comparison of Trends

Trends	% United States	% Japan	% West Germany
R&D as a percentage of GNP			
1964	3.0	1.5	1.6
1976	2.3	1.9	2.3
Average annual rate productivity improvement 1960–78	2.6	8.5	5.4
Share of world's exports			
1960	18.0	4.0	10.3
1977	11.8	8.0	11.5

Although the statistics cited here are disturbing, the situation is not hopeless. Since technological innovation is derived from the talent of its people, it is within US control. That cannot be said for energy sources or many raw material supplies. Indeed, the growing dependence of the United States on foreign energy and raw materials makes it all the more important that America's potential for technological innovation be realized.

Fostering Technological Innovation — Freedom and Incentives

With technology so important to the national interests, yet declining in America, the Federal government must act with a sense of urgency to stimulate technological innovation. Maintaining and extending technological leadership should be a national priority.

Unfortunately, changes in the rate of technological innovation will come slowly. Innovation can't be *forced;* it can only be *fostered.* It is fostered by creating an environment that emphasizes *freedom* of scientific and industrial activities and that offers *incentives* to the innovators, entrepreneurs, and investors who have the talent and resources to advance technology. Massive government R&D programs aren't the answer. Innovation doesn't thrive in bureaucracies. Innovation takes place when an individual or a small group gets an idea, has the freedom to pursue it — perhaps to succeed but maybe to fail — and can realize some attractive reward if successful.

Most of the commercially useful breakthroughs in genetic engineering have taken place in the laboratories of small companies run by entrepreneurs, not in the huge pharmaceutical corporations. The development of the American semiconductor industry is a history of entrepreneurship and small company contributions. In fact, according to a 1967 Department of Commerce report, more than half of the major technological advances in this century originated from individual inventors and small companies.

Technology-Oriented Tax Policy Is Needed

Starting today the US must begin to recreate an environment in America that fosters innovation. It should be an environment based on free enterprise, free trade (with strict bilateral reciprocity), and freedom from unnecessary regulation. It should also be an environment with incentives that encourage investment, risk-taking, new ideas and entrepreneurship.

Eliminating ill-conceived regulations and government programs to protect and subsidize noncompetitive enterprise will go a long way toward unleashing creative forces and encouraging proper allocation of resources. However, the most powerful instrument available to the Federal government for fostering technological innovation is a tax policy that stimulates investment, entrepreneurship, and technical education and research.

Over the past two years the country has seen the powerful effect that such tax policy can have on economic growth and technological development. In 1978, the American Electronics Association, a trade association of more than 1,300 high-technology companies in the United States, presented to Congress the results of an extensive survey of the environment facing young, innovative electronics firms. That survey documented the importance of young companies in solving the nation's unemployment problem. It showed that young companies create jobs 20–115 times faster than mature companies in the electronics industry. In fact, although the mature companies in the survey average 27 times more employees than the younger companies, the younger companies were creating more new jobs per firm per year than the mature companies.

The AEA survey confirmed that risk-capital investment is essential to the start-up and growth of high-technology companies. Such companies require constant infusions of risk capital in order to finance their growth and employment increases. On the average, about $14,000 of risk capital was needed to create each job in the electronics industry since 1955.

In addition to the creation of jobs, these young companies, if adequately financed, generate other benefits to the country. For example, for each $100 invested in electronics companies founded during 1971–75, by 1976 those companies were generating $70 per year in exports, spending $33 per year on R&D, and accounting for $30 per year in Federal income taxes. In other words, the study documented the remarkable fact that the Federal government could get a 30% annual return on the risk capital invested by individual investors if only those investors had adequate incentives to make such investments!

Unfortunately, those incentives had been substantially reduced during the 1970s with the doubling of the maximum tax rate on capital gains from 25% to 49%. As a result, the risk capital needed to start and finance the growth of high-technology companies had all but dried up. In the period 1971–75, companies in the electronics industry were able to raise less capital (in constant 1972 dollars) than at any time in the prior 15-year period.

In order to rekindle the incentives for needed risk-capital investment, the AEA strongly urged in 1978 a sharp reduction in the tax on capital gains on the grounds that it would once again make risk capital available to young companies. Since such a reduction would have a stimulative effect on the economy and the stock market, the AEA predicted that this tax cut would increase Feeral tax revenues rather than decrease them.

1978 Revenue Act Highlights

The Revenue Act of 1978 contained a reduction in the maximum capital gains tax rate to 28%. The results of that new incentive have been extraordinary. Here are some of the highlights:

- Commitments of new capital to professional venture capital funds during the 18-month period between mid-1978 (when the passage of capital gains tax reduction appeared certain) and year-end 1979 totaled nearly $900 million. This increase in funds, which is now available for investment in young and growing companies, is more than double the total amount of capital committed to such funds during the seven-year period 1970–77.
- Annual investments from such venture capital funds into young companies have

more than doubled since the capital gains tax rates were reduced and, more importantly, more money is now going into start-up situations.

- Young companies are now able to obtain needed capital from the public market far more easily than before the capital gains tax rates were decreased. For example, in the first quarter of 1980 the number of public offerings (31) and the funds raised by them ($139 million) were both more than double the comparable amounts for the first quarter 1979 — a year in which the number of new public offerings was greater than in any of the six previous years.
- Since the Revenue Act of 1978 was passed — despite accelerating inflation, rising interest rates and impending recession — the price appreciation of public company stocks, particularly those of small companies, has been excellent. Between November 1978 and June 1980 the NASDAQ index rose nearly 97% and the AMEX index rose 55%. Importantly, by September 16, 1980, the Standard and Poor's 500-stock index reached a level 41.6% above its close on April 13, 1978, thereby exceeding the 40% increase in stock prices that had been projected by Chase Econometric Associates, Inc., to occur by 1982 as a result of the capital gains tax reduction.
- Cutting the capital gains tax rates has not resulted in the large revenue loss that the Treasury had predicted. Instead, the Treasury collected $8.3 billion in capital gains taxes in 1979, the first year of the lower rates, *up* 14% from the $7.3 billion collected in 1977, and the $7.2 billion collected in 1978. The Treasury is collecting more at the lower rates than at the higher rates without even including the higher corporate and personal income taxes resulting from the economic stimulation that the lower capital gains tax rates are producing.

From the experience of the 1978 Revenue Act and its effect on risk capital needed to promote technological innovation, the country has seen proof of the power of tax policy in creating an environment to foster innovation. What follows are the specific proposals that must be implemented this year in order to provide further stimulus to innovation and to reverse the decline of America's technological leadership.

A Tax Policy for Fostering Technological Innovation

In order to maintain and extend its technological leadership, the US must implement a tax program that stimulates the key ingredients necessary for innovation:

- Risk capital investment;
- Entrepreneurship and individual risk taking; and
- R&D activities and education of technical personnel.

The following program would provide such stimulation and could be implemented easily.

1. ***Reduce capital gains tax rates further.*** So long as further reductions of capital gains tax rates have stimulative effects, they should continue to be implemented. The country has already experienced the dramatic positive impact of the 1978 reduction. Further cuts will undoubtedly result in additional stimuli to needed investment and risk taking.

It is not clear what the "optimal" capital gains tax rate is, but there are strong indications that exempting capital gains from taxation entirely would be best for our economy. Not taxing capital gains would also put the US in line with the policies of Japan and West Germany, which have had excellent records of technological advancement and economic performance in recent years.

Reductions in the capital gains tax rates should be made in phases every few years — with monitoring of the efficacy of each cut — until further reductions appear to be unjustified. As the next step, the maximum tax rate on capital gains should be reduced to about 15%. This reduction would be about the same percentage decrease as the one made in 1978.

The needed reduction of capital gains tax rates could be accomplished by one of two methods:

- Eliminate the distinction between "earned" and "unearned" income, taxing all income at the maximum rate of 50%, and increasing the excludable portion of capital gains for income tax purposes from 60% to 70%; or
- Increase the excludable portion of capital gains for income tax purposes from 60% to 80%.

In either case, capital gains should be eliminated as a preference item for calculating the minimum alternative tax.

2. *Reinstate restricted stock options.* Such stock options, which were in effect from 1950 to 1964, were a powerful tool for attracting talented scientists, engineers, technicians, and managers to risk their careers in ventures developing new technologies and products. Normally, few employees have the capital needed to become significant owners in the companies that employ them, but restricted stock options provided employees with the benefits of ownership without requiring them to make the up-front cash outlays. Instead of cash they were able to invest their time, careers, and talents.

A series of changes in the tax code from 1964 to 1976 eliminated restricted stock options entirely. Today, companies can grant only "nonqualified" options which are practically useless to most growing companies. Under the present law, when an employee exercises these "nonqualified" options, he must pay taxes — at ordinary income tax rates — on the "paper profit" between his option price and the price of the stock when he buys it. Not only is taxation at ordinary income tax rates inconsistent with what other owners pay on their capital appreciation but, in addition, the employee must pay the tax *before* he actually realizes the gain from selling the stock. It's analogous to taxing the appreciation on a homeowner's house each year even though he doesn't sell it. Employees without reserves of funds may not be able to buy the stock and also pay the tax on a "paper profit."

The terms of restricted stock options would enable an employee to purchase the stock and — if the stock is held for a suitable period — pay a capital gains tax on the difference between his selling price and his purchase price. Tax payments for restricted stock options are not made until the employee has actually realized the gain.

When they were in effect, restricted stock options were found to motivate employees to do a better job and find better ways to do the job. Since a stock option has value to the employee only if the price of the company stock increases through growth in its sales and profits, options give employees a strong incentive to find ways to expand the company's business and conduct that business more efficiently. Business growth creates more new jobs; increased efficiency results in greater productivity; and incentives to develop new ideas result in technological advancement.

In 1980, the Joint Committee on Taxation examined the revenue impact of restoring restricted stock options. The Joint Committee estimated that such a change in tax policy would result in a ***net revenue gain*** to the Treasury of $35 million in the first six years after the legislation is passed.

3. *Offer 25% tax credits to businesses for contributions to technical education programs, for increases (over a three-year base period) in their R&D expenditures, and for contributions to R&D programs conducted by colleges and universities.* The purpose of these tax credits would be to provide private industry with direct incentives to assist in the education of more technical personnel and to step up research and development being done in companies and in academic institutions.

It's a disgrace and a disturbing fact that Japan, with a population half as large as the United States, trains four times as many scientists and engineers per year as the US. Out of every 10,000 citizens in Japan, 400 are engineers and scientists while only one is a lawyer and three are accountants. Out of every 10,000 citizens in the US, only 70 are engineers and scientists, but 20 are lawyers and 40 are accountants. The US is becoming a society of paper-pushers, rather than producers. More money must be focused on training technical personnel and funding the research that they do if the US is to maintain its leadership in technology.

These proposed educational and R&D tax credits should be viewed both as ***incentives*** for private enterprise to contribute more to technological programs and as ***partial funding*** by the Federal government of private educational and R&D activities. Private enterprise can select and manage technical programs better than the government can, but by assisting in the funding of those well-managed programs, the government can help to produce efficiently the beneficial effects of faster technological progress.

Although detailed econometric analyses of this particular proposal have not yet been done, Data Resources, Inc., studied the effect of a 25% tax credit for all R&D expenditures (not just increases). That study concluded that during the period 1978–87 such a tax credit would:

- Increase R&D spending by an average of $5.2 billion per year;
- Add an average of $36.2 billion to the GNP per year;
- Add an average of $1.7 billion to U.S. exports per year;
- Increase productivity by an average of .28% per year;
- Reduce the annual increase in the consumer price index by .42% per year.

These estimates are indicative of the kind of impact that 25% R&D tax credits on *increases* in R&D expenditures would have, but such tax credits would be far more efficient.

Summary

Maintaining its leadership in technology should be a national priority for the United States. The most effective instrument for fostering technological advancement is tax policy. A tax program consisting of:

- Lower capital gains tax rates;
- Institution of restricted stock options; and
- Tax credits for contributions to technical education and R&D increases should be instituted in 1981. Such a program would create in this country an environment that fosters innovation and enables the US to enhance and exploit its most valuable national resource — technology.

Mr. FUQUA. Thank you very much, Dr. Zschau.

If we could, I would like at this time to recognize one of our other distinguished colleagues from California, Congressman Dannemeyer, to introduce a constituent and then we may have some questions for both of you as soon as Mr. Knapp finishes his testimony.

We are very pleased to have you with us, Bill, and you are welcome to make any comments you like and introduce the witness.

Mr. DANNEMEYER. I would like to introduce the witness sitting to my right, Mr. Randy Knapp. He is a member of the American Electronics Association. He has been asked by that organization to come and make comments of that organization concerning the legislation now pending before this committee.

That association has 1,800 members nationwide. They employ about 1 million people. I don't want to put the distinguished chairman of Florida on, but about 600 of these 1,800 companies are located in California and about 8 percent of them are located in Orange County, Calif., a portion of the area which I am privileged to represent here in the Congress.

So the electronics business is an important business to California and it is an important business to the district that I represent here and that is what brings me here this morning to introduce Mr. Knapp.

Mr. Knapp is president and chief executive officer of his own company. To give you an example, his company was formed just about 7 years ago in April 1975, and they employ 180 people.

He lives in Orange County, his business is in my district and he has been on the board of directors of this association for some 3 years and he has been designated by it to be its spokesman here this morning. He is a former chairman of the Small Business Services Committee of the American Electronics Association.

With those comments, I would just like to introduce Mr. Randy Knapp and let him make the comments he chooses to be appropriate.

Mr. FUQUA. Thank you, Bill.

I have had occasion to visit your fine State on several occasions. My observations have noted the amount of electronic industries you have in that State.

Mr. Knapp, we are very happy to have you here and you may proceed with your statement.

Mr. **Knapp**. Thank you, Mr. Chairman, and members of the Science and Technology Committee. It is indeed a privilege to have the opportunity to testify here before you on the legislation that you are currently considering.

To give you a further indepth explanation of the American Electronics Association so that you understand the segment of the high-technology community I am here representing, today, of the 1,800 member companies, 80 percent of those companies represented what we classify as small business, or under 500 employees.

Twenty percent of those companies, then, fall into the large categories. The largest member of our organization is IBM, with about a quarter of a million employees, and the smallest member is Western Data Systems, with one employee.

It is a democratic organization. Each membership represents a single vote, so my vote in the organization carries as much weight as any other company's vote in that organization.

I happen to be one of the founders of one of the permanent standing committees of AEA, that being the Small Business Services Committee, and I have served on that committee for a period of 2 years.

I feel that I represent the interests of the small business segment of our association.

In reviewing the legislation that you are currently considering, it came to mind that in the past, set-aside programs of this type have had some questionable results.

We feel very honored by the fact that you are considering our segment for development and strengthening in the industrial community.

However, Mr. Chairman, as much as we are here to thank you for that consideration, in this particular legislation, please don't do it for us.

We feel there are alternatives that can accomplish the goals and objectives that we think are justified in your attentions, but in this type of program, we feel that the accomplished task just won't be fulfilled.

In investigating the premise under this legislation, we find that some of the basic statements about the legislation, itself, from our point of view, aren't really the emphasis of the problem.

For instance, the Federal procurement officers are biased in favor of larger companies. We find that not to be true. In our negotiations as a Government subcontractor, we find that there is a great deal of effort placed on these gallant individuals who are considered to be soldiers in this fight to maintain some intelligent balance and distribution of the Government business, but, in fact, are frustrated by so many current regulations and socioeconomic programs.

In fact, in my written testimony, I have included some 80 different regulations that each Federal procurement officer must consider before he lets a contract to me, and we feel by streamlining this procurement process and allowing these strong professionals to do their job in a free, competitive situation, is the best way of encouraging innovation and technological growth in our country.

In 1978, the American Electronics Association took a position supporting the reduction of capital gains taxes. In fact, the witness that you just heard from was one of the strongest advocates and spokesmen on our behalf in that particular effort.

At that time, comments were made that this was a millionaire's tax relief program, that it was millions of dollars for the rich and two-bits for the average man, and, in fact, that particular legislation has generated such an encouraging effect on capital formation that today the private sector is providing that capital necessary to fill the capital gap that has been referred to before this committee.

Therefore, we feel at this point of time, and I think Wesper Corp., if put under the microscope, could be noted as an example of the availability of current capital for growth and expansion in R. & D.

So at this time we feel the capital availability is well in place through the efforts of Congress on our behalf in the capital gains tax reduction bill.

As an alternative though, to this particular legislation, we feel that a bill currently being offered by Congressman Barry Goldwater, Jr., cosponsored by Congressmen Bob Matsui and Vic Fazio, is the kind of legislation that is oriented toward the tax-stimulated individual motivation of entrepreneurial activity.

If I can briefly explain this legislation, bear with me some since I don't happen to be a legal mind, but I will try to go through it.

This legislation proposes that we extend the current R. & D. tax credits to, first, unincorporated R. & D. ventures both by proprietors and by R. & D. partnerships and also to extend a carry-forward provision so that these R. & D. expenditures can be carried forward against future profitability.

In this way we feel that is an individually motivated, self-motivated stimulation to the small entrepreneurial innovater to allow him then to go ahead with his particular program, or idea, and accomplish the goals of a free enterprise system and, of course, accomplish his own personal goals.

Without taking up too much of your time, what I would like to do is conclude my testimony by saying thank you for inviting me.

We in the small business community feel that the past legislation that has been enacted on our behalf such as the capital gains tax relief, the stock option plans, R. & D. tax credits, have given us a great forward momentum that is going to pay off in very productive and innovative results over the next decade.

Again thank you for allowing me to testify.

[The prepared statement of Mr. Knapp follows:]

STATEMENT OF

Randy Knapp, Chairman,
President and Chief Executive Officer
Wespercorp

before the

House Committee on Science and Technology

January 28, 1982

Summary

- AEA is the largest association of high technology electronics firms in the nation.

- HR4326 is intended to aid small high technology firms. We appreciate that, but still strongly oppose it. Though more than 80% of our member companies would qualify for the "protection" it offers, first AEA's Small Business Services Committee and then its Board of Directors voted unaminously to oppose it.

- The Committee report on HR4326 blames the low participation of small companies in Federal R&D contracts on anti-small business bias by civil servants. They prescribe pro-small business discrimination as the remedy.

- AEA blames instead the impenetrable morass of regulations spawned by more than 80 socioeconomic programs superimposed on top of the procurement "system". (See appendix) Passing still another new quick-fix program will not improve the problem but only make it worse.

- Existing set-aside programs have spawned a rich literature of abuse, waste, mismanagement and failure. This has been documented before the Committee which reported HR4326--yet it contains no safeguards to prevent future recurrence.

- A positive alternative to this bill exists. A tax credit for the pre-incorporation R&D costs of start-up companies would assure that every federal dollar would be spent by risk-taking entrepreneurs rather than agency program managers.

AEA **American Electronics Association**
1612 K Street, N.W., Washington, D.C. 20006

STATEMENT OF
RANDY KNAPP, CHAIRMAN,
PRESIDENT AND CHIEF EXECUTIVE OFFICER
WESPERCORP

BEFORE THE
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
JANUARY 28, 1982

Mr. Chairman and Members of this distinguished Committee, I am Randy Knapp, Chairman, President and C.E.O. of Wespercorp, a young high technology company, employing a total of 180 people with plants in Tustin, Costa Mesa and San Diego, California. Wespercorp makes interface controllers for mini and microcomputers, and sells to both the end-user and OEM markets. We devote approximately 6.5% of our annual revenues to R&D. We derive 16% of our revenue from exports.

I am appearing before you this morning on behalf of the American Electronics Association. AEA is the largest association of high technology electronic firms in the nation. Our members manufacture semiconductors, and other components, computers, instruments, defense products and systems. Many supply products and services in the communications industries.

Like the electronics industry itself, AEA's membership contains many more small firms than large. Of our 1,800+ members in 43 states, 80% employ 500 people or less. These are fast growing entrepenurial firms with strong free market and free trade views. They are the companies which, in 1978, defied 10 years of tax policy momentum in the opposite direction and first called for reducing capital gains taxes. These are the people who led the lobbying for the R&D tax credit and initiated the Incentive Stock Option provision in the 1980 tax bill -- even though they knew that restoring stock options would require them to pay higher taxes.

We want to begin by thanking this committee for inviting us to testify this morning. We have strong feelings about the bill before you, though unfortunately not those its authors intended.

Mr. Chairman, the proponents of this bill are trying to help young high technology companies. They are trying to help us. We sincerely appreciate that...but please don't do it. Though our Association and our companies' contributions to the U.S. economy are specifically cited in both the House and Senate reports on this bill; though more than 80% of our member companies would qualify for the "protection" it offers, we ask you not to pass it.

AEA's Small Business Committee and its board of directors have both voted unanimously to oppose HR4326. We believe it offers the wrong solution to the wrong problem. We also think there is a better, more effective and more economical way to achieve its goal.

The Case FOR the Small Business R&D Set-Aside

In summary, the House Small Business Committee's report explains the case for the bill as follows: Technological innovation is critical to the future of the U.S. Small companies generate a disproportionate share of innovation in the U.S. R&D is a key element of the innovation process. Over the past decade the federal government has accounted for more than one-half of all R&D funds spent in the U.S. Of that amount, only a tiny fraction, roughly 4%, has gone to small firms. Both the Federal Government and the U.S. economy would benefit from increasing that percentage, but that is prevented by federal bureaucrats who actively discriminate against small R&D firms. Therefore, a mandatory set-aside of all agencies' R&D budgets is necessary to force the award of more R&D funds to small companies.

A Faulty Diagnosis

We agree with this statement up to the point of blaming the Civil Service for the problem. Blaming the bureaucrat in this case is just shooting the messenger for bringing bad news. He is not the source of the problem.

The real problem, in AEA's view, is not the anti-small business bias of civil servants but the unbelievable complexity of the Federal procurement process itself. It was Congress--not the bureaucrats--which has overlaid the procurement "system" with at least eighty separate socio-economic programs, special interest set-asides, preferences, enforcement responsibilities and other miscellaneous "good ideas". And it was Congress which has thereby thwarted all but the most determined small business participation. Until this proliferation of social legislation on top of the procurement process is pruned back, it is going to be impossible to lure any significantly larger proportion of small companies into the system. In our opinion the best place to begin that pruning is with the bill you have before you today.

Demanding the Impossible

Mr. Chairman, the job of purchasing the huge quantity and variety of goods and services the government needs in an open, fair and economical way is a massive undertaking in and of itself. Government contracting personnel have always had a difficult enough job just mastering the system and keeping up with its constant changes. In these days of retrenchment and RIF's their task is even harder. But when the acquisition process is then overlaid with scores of additional social requirements it becomes nearly impossible for government employees to administer, let alone for small companies to penetrate.

In our experience, Federal civil service employees are predominantly dedicated and hard working people. But they have been assigned tasks and workloads which are virtually impossible to carry out. They badly need more training, more staff backup and incentives to manage effectively. But most of all they need a job that can actually be performed. Acquisition of goods and services for the U.S. is such a job, and they could do it if we let them. But instead, we have gotten into the habit of asking them to be foot soldiers in our efforts to deal with nearly every one of the social problems facing our society.

Appended to this statement is a shocking list. AEA compiled it with the help of OMB's Office of Federal Procurement Policy, DOD, NASA and GSA. Though it is not complete, it certainly illustrates the point. We wonder how many Congressmen are actually aware that there are already more than 80 separate socioeconomic programs superimposed on top of the Federal procurement system? The enforcers of all these "good ideas" are the people also charged with purchasing the government's goods and services. But the people who are actually required to do all these things are the companies who try to sell to the Federal government.

"Benefits" of Becoming a Government Contractor

For example, is inflation getting out of hand? Do we need voluntary wage-pricing guidelines? Then let's make them mandatory for government contractors. Is the air dirty, or the water? Is energy being wasted? Then government contracts can be turned off or on to deal with it. Are things too noisy? Government contractors must buy the quiet version, even if it costs more. Are non-union wage scales threatening important interest groups? Then the Secretary of Labor can require government contractors to pay union scale in various industries. Are there animals that need protection? Government contractors are just the ones to do it.

Are some companies giving their employees more free days through a four day work week instead of five? Not if they're government contractors. Is almost any industry or special interest group in the U.S. having a hard time competing anywhere (except Canada)? Then government contractors can be required to buy their products. And wouldn't you really rather be paid for your work in excess foreign currency than in greenbacks? You should prefer that if you want a government contract. These are just a few of the wonderful socio-economic opportunities available to those brave enough to venture into the realm of government contracting. There are many more, each with its own peculiar rules and voluminous recordkeeping requirements.

Is it really a mystery, then, why so many small businessmen with viable products or services pass up the chance to become federal contractors? There is a lot more going on here than bureaucratic bias. And it certainly will not be solved by creating yet another special interest set-aside.

Mr. Chairman, by our very incomplete count, the procurement system already contains more than 30 special interest set-asides immortalizing the lobbying success of various groups in our society. There are set-asides for small business in general, for economically disadvantaged businesses, small timber companies, handicapped persons, minority construction firms, prison-made supplies, blind-made products, U.S. made products, labor surplus areas, U.S. fibers, U.S. shipyards, U.S. ocean vessels, U.S. jewel bearings, and U.S. buses. These are just some of the set-asides. Then there are "discretionary" preferences, labor standards, enforcement responsibilities and foreign policy requirements.

Each one of these requirements is no doubt worthy and justified by itself, but how many more can we dream up, and when will we ever stop?

Just as more and more of the Federal fiscal budget has been consumed by special interest entitlement programs which no one dares oppose, the Federal procurement budget is also being parceled out to politically powerful special interests that no one wants to offend.

It's not much of an exaggeration to say that at some point the only way anyone will be able to get a contract will be to hire a lobbyist and get a new set-aside.

We are by no means the first group to raise this problem. As long ago as 1972 the Commission on Government Procurement warned Congress that the procurement system could not accomodate all the extra freight that was planned for it. The Commission stated: "The cumulative effect of the programs already imposed on the procurement process and the addition of those contemplated could overburden it to the point of threatening breakdown."

Calling a Halt

And who can call a halt? Who has standing to say "enough"? The people who already have the business have a conflict of interest. The people in other businesses have no standing to meddle and probably don't want to offend the special interest involved anyway. The only people with the ability to say "no, thank you" and make anyone listen are intended beneficiaries. In this case that is us and that's just what we want to say.

Mr. Chairman, our companies didn't ask for this set-aside. We have told everyone who ever asked that we oppose it. We don't want to embarrass friends who have already voted for this bill by publicly opposing it now. But if they were led to believe they were helping us through this bill, they were misled.

We believe it's time to call a halt to the easy habit of passing flashy new quick-fix programs that make the problem worse as a way of avoiding having to clean out the accumulated debris of the last 30 years.

No one contends we can go on like this indefinitely. We believe it is time to begin simplifying and streamlining the Federal procurement system. That is what will bring more small companies into the process.

Objections to Special Interest Set-Asides In General

But Mr. Chairman, even if Congress promised to streamline the procurement system and just leave "our" set-aside, we would still object.

Fundamentally, we oppose political intervention in the marketplace on behalf of special interests--even if it is ours. We think each Federal agency should be held responsible for accomplishing its own mission, not for subsidizing groups like ours. We do not believe companies can be made more competitive by being sheltered from competition.

But the practical problems with special interest set-asides are even greater than these conceptual objections. A rich literature of abuse, waste, mismanagement and failure has grown up around existing set-aside programs. Numerous General Accounting Office reports, Congressional hearings, law journal articles and press exposes have documented the problems that plague this technique. Among those most frequently found are:

- Use of ineligible subcontractors to perform the bulk of the contract;
- Selections based on political favoritism;
- Contractors becoming dependent on the set-aside program, treating it as their sole line of business;

- Awards concentrated on a small number of eligible contractors, thereby drastically limiting participation of the bulk of eligibles;
- Set-aside contracts awarded at much higher cost than if let competitively;
- Lack of rational bases for size eligibility standards;
- Organization chart manipulation to stay in the program after reaching the size ceiling; and
- Failure to implement safeguards mandated in the program.

Where Are the Safeguards?

Though these abuses are serious and have been described in detail before the very committee which reported this bill, an uninformed reader of the Committee's report would never know any abuse ever existed. They have been totally ignored. Since the possibility of abuse in a set-aside is never even mentioned, it isn't surprising that the bill contains no safeguards to prevent them in the future.

What Size Companies Care About this Bill?

Mr. Chairman, it's fair to say that AEA's acceptance of your invitation to testify on this bill today has not met with overwhelming enthusiasm in every part of the Hill. Some people have a hard time believing there are actually companies out there that would turn down "free money". We have heard grumbles that somehow we are being manipulated by our larger members to take a position contrary to the interest of our small companies. Ironically, almost exactly the opposite is true.

The fact is that most large companies who sell to the federal government, including those in AEA, have come to terms with this "system" long ago. They are much more able to cope with the socioeconomic demands involved than the smaller companies. The larger companies have the resources to do what they're asked and hand the bill to the taxpayer. The proliferation of special interest set-asides does not pose much of an economic threat to them. Those that do oppose set-asides do so out of public policy conviction, not out of concern for their own market share. This bill is not even an issue for most of them. In fact, at least one of our large members companies testified in favor of this bill.

Many of our association's smaller companies, on the other hand, are implacably opposed to enactment of new special interest set-asides. They have observed the existing programs in the field and have been appalled, both as businessmen and as taxpayers, by what they saw. These companies are less able and less willing to pay the social engineering tribute required of Federal contractors.

Two years ago the AEA Small Business Service Committee, made up entirely of the presidents of companies with under 300 employees, asked the AEA Board to formally oppose any new special interest set-aside that might be proposed in the procurement system. They did not seek repeal of the existing programs, but asked their association to call publicly for a moratorium on new set-asides when the next one surfaced. The AEA Board unanimously adopted the committee's proposal. (It did not attach a tag line saying "...unless the new set-aside is for us"!) And that's how we came to be here today.

But we are still puzzled by the charge that we are fronting for one size company at the expense of the others. The premise seems to be that a gulf exists between the interests of large and small companies in general that makes them natural opponents on a bill like this. We can't speak for other industries, but in the high technology field that just isn't the case. In our industry there is a substantial agreement on most public policy issues between our large and small companies. Their management and financing challenges are very different, and they compete with each other vigorously. But the philosophical outlook of these people does not divide along company size lines.

Mr. Chairman, my company is not small because I've been held down and exploited by some giant competitor. Wespercorp is small because we haven't grown large yet. In our industry being a small company is a normal and usually temporary stage of development. We are planning to grow just as fast as we can and aim to be a Fortune 500 company some day. So when people in Washington tell you that by shackling larger companies they are somehow helping me, I want you to know they are working on their own agendas, not mine.

Tax-Based Incentives vs. Direct Federal Spending

As I have said, we agree with the proponents of HR4326 that there is an urgent need to improve the rate of innovation in this country. Our companies, both large and small, are competing for world markets against the toughest competition there is. We appreciate the willingness of Congress to help, but we believe the form of that help makes a big difference.

Our companies believe the best, most effective and highly leveraged way the Federal Government can promote innovation in this country is to improve rewards for risk-taking innovators. We believe tax-based incentives for technological achievement are much more effective in promoting innovation than direct Federal spending. This is the message we have been bringing to Washington since 1978 when we first asked Congressmen Steiger to introduce a cut in capital gains taxes.

We are not surprised to see that some of the same people who are leading the drive for this special interest set-aside today are the ones that led the fight against the capital gains cut in 1978. Then, as now, our small companies were accused of fronting for "fat cats." The Secretary of the Treasury called the Steiger amendment a "millionaires relief act." President Carter charged us with seeking "huge windfalls for millionaires and two bits for the average American. On the Senate floor the cut was called the most blatant example of "trickle-down economics" ever. Well, the 1978 capital gains cut may indeed have been what some consider "trickle down economics", but it was also spectacularly successful.

Concrete Results of the Tax Incentives Approach in Stimulating Young Companies

Since the 1978 cut in capital gains taxes there have been remarkable improvements in the ability of young high technology firms to start up and grow. Among the highlights:

- Commitments of new capital to professional venture capital funds during the 18-month period between mid-1978 (when passage of capital gains tax reduction appeared certain) and the end of 1979 totaled nearly $900 million. This increase was more than twice the amount of capital committed to such funds during the 7-year period 1970-77. The 12 months of 1980 generated another $900 million, and by the end of 1981 another $1.25 billion has been committed.

- Investments from venture capital funds into young companies since 1978 has reached $1.2 billion per year -- more than four times the rate of investments before the 1978 cut and significantly more of this money is now going into start-up situations.
- Young companies are now able to obtain needed capital from the public market far more easily than before the capital gains tax rates were decreased. In 1980, new capital raised through initial public offerings of company stock jumped to $820 million, double the amount raised in 1979 and more than four times the average raised per year during the period 1975-78. But by the end of 1981 it has doubled again to $1.76 billion!

Mr. Chairman, when the track record of the tax policy approach to stimulating innovation is compared to the sorry record of the special interest set-asides that already exist, who can seriously contend that we should enact still another set-aside?

A Positive Alternative

But there is still a better, simpler cheaper and more effective way to help young, research oriented high technology companies which is the goal of HR4326.

The Economic Recovery Act of 1981 contains a new tax credit for increases in corporate R&D. Companies may take a credit for 25% of the increase in their R&D outlays over their average spending for R&D over the previous three years. A special provision for start-up companies allows them to calculate their first year tax credit using a base of three years of zero spending, the second year using two years etc. The principal limitation of this provision, from the new company's point of view, is that it does not allow start-up companies to "carry forward" the R&D costs they incurred prior to incorporation.

A new bill sponsored by a member of this Committee Congressman Barry Goldwater, Jr. along with Congressmen Matsui and Fazio would remedy this problem. It would make the R&D tax credit more available to start up firms by recognizing pre-incorporation R&D costs incurred "in connection with" the business instead of those incurred "in carrying on" the business as currently required.

Last year the AEA Task Force on the R&D Credit recommended this modification to permit new corporate businesses and other groups (including partnerships and individuals) to obtain the credit as long as the credit is allowed only to offset liability on income from that new business. In this way a new business could obtain the benefits of the R&D credit to the extent that the business eventually generates profits and therefore taxable income.

One possible criticism of this proposal is that the credit would become available to tax shelter partnerships. However, under the proposal these partnerships could utilize the credit only against partnership income. Thus the proposal would only encourage partnerships which are successful in generating profits from partnerships research.

We strongly recommend this tax credit incentive approach in lieu of the direct Federal spending strategy of HR4326. The key point is that it would leave the critical resource allocation decisions where they belong, in the hands of risk taking entrepreneurs. We believe people who are investing their own funds make much better decisions on R&D projects than civil service program managers, no matter how well intentioned.

In summary Mr. Chairman, we believe the Small Business Innovation Development Act is a severly flawed response to a badly diagnosed malady. It should not pass. Small high technology companies need new incentives for innovation, not added barriers.

APPENDIX

Partial Listing of Socioeconomic Requirements Superimposed on the Federal Acquisition Process

The following list has been compiled from materials supplied by the O.M.B. Office of Federal Procurement Policy, Department of Defense, National Aeronautics and Space Administration, General Services Administration and the Commission on Government Procurement. It is not exhaustive and the classifications used are necessarily somewhat arbitrary. AEA believes that this list provides an indication of the barrier faced by small companies in participating in the Federal Acquisition Process.

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AEA American Electronics Association
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Partial Listing of Socioeconomic Requirements Superimposed on the Federal Acquisition Process.

SPECIAL INTEREST SET-ASIDES

1.	Prison-made Goods	18 U.S.C., sec. 4124	Federal departments shall purchase such products of the Federal prison industries as meet their requirements and may be available.
2.	Blind-made Goods	41 U.S.C, sec. 46-48	All brooms, mops and other suitable commodities shall be procured from non-profit making agencies for the blind where articles are available within the period specified at the price determined by the Comm. on Purchases of Blind-Made Products to be the fair market price. Excludes supplies which by law must be procured from any Federal Department or agency or are for use outside continental U.S.
3.	Transportation of supplies: preference to U.S. vessels	10 U.S.C., sec. 2631	Only U.S. flag vessels may be used in transportation by sea of supplies of the Army, Navy, Air Force and Marine Corps unless charges are excessive or unreasonable.
4.	Transportation of supplies: preference to U.S. vessels	46 U.S.C., sec. 1241(b)	At least 50 percent of supplies contracted for by the U.S. must be transported on privately-owned U.S. flag vessels to extent available at reasonable prices.

5.	Transportation from CRAF carriers	Annual DoD Appropriation Act, e.g., sec. 830 of P.L. 93-437	Of the funds appropriated for the Militar Airlift Command a specified dollar amount is available only for the procurement of commercial transportation from air carriers participating in the Civil Reserve Air Fleet program.
6.	Transportation on U.S. air carriers	Title XI of Federal Aviation Act as amended by sec. 5 of P.L. 93-623	Federal agencies in procuring air transportation between a point in the U.S. and a foreign point or between two foreign points shall use U.S. certified air carriers to the extent service is available.
7.	Alteration, overhaul and repair of Naval vessels	Annual DoD Appropriation Acts, e.g., P.L. 93-437 under Appropriation O&M, Navy	Of the total amount appropriated for the alteration, overhaul, and repair of Naval vessels, not more than an amount stipulated in the Act is available for the performanc of such work in Navy shipyards.
8.	Noise Control	Noise Control Act of 1972; 42 U.S.C., sec. 4914(c)	Low noise emission products as certified by the Administrator of EPA shall be acquired by purchase or lease by the Federal Government for use by the Federal Government in lieu of other products if the Administrator of General Services determines that such certified products have procurement costs which are no more than 125 per centum of the retail price of the least expensive type of product for which there are certifie substitutes.

9.	Maintenance of a Mobilization Base for Jewel Bearings	ASPR 1-2207.2	Government and contractor purchases of jewel bearings shall be made from the William Langer Jewel Bearing Plant, Rolla, N.D. subject to certain exceptions.
10.	Maintenance of a Mobilization Base for Miniature and Instrument Ball Bearings	ASPR 1-2207.3	All procurements of miniature and instrument ball bearings and all procurements of items containing the same must be of domestic manufacture subject to certain exceptions.
11.	Maintenance of a Mobilization Base for Precision Components for Mechanical Time Devices	ASPR 1-2207.4	All procurements of precision components for mechanical time devices and all procurements of items containing the same must be of domestic manufacture only subject to certain exceptions.
12.	Required Source for Aluminum Ingot	ASPR 1-327, FPR subpart 1-5.10	To eliminate excess quantity of aluminum in the national stockpile.
13.	Preference for Domestic Hand Tools	Annual Appropriation Act	Restrict purchase of foreign hand tools.
14.	Restriction on Conversion of Heating Plants in Europe	Annual DOD Appropriation Act	Prohibit use of funds to convert heating plants from coal to oil.
15.	Prohibition on Purchase of Non-U.S. Stainless Steel Flatware	Annual GSA Appropriation Act	Prohibit use of funds for purchase of stainless steel flatware not made in U.S.
16.	Indian Self-Determination and Education Assistance Act	P.L. 93-638	Require preference to Indian labor and Indian firms in carrying out programs for the benefit of Indians.

17.	Buy American Act	41 U.S.C., sec. 10 a-d; Exec. Order 10582, Dec. 17, 1954; ASPR 6-100 and 18-500	Only articles, materials and supplies produced in the U.S. shall be acquired for public use in the U.S., with certain exceptions.
18.	Buy American Food and Clothing	Annual DoD Appropriation Acts, e.g., sec. 823 of P.L. 93-437; ASPR 6-300	No appropriations under the Act shall be available for procurement of any articles of food, clothing, cotton, woven silk and woven silk blends, spun silk yarn for cartridge cloth, synthetic fabric or coated synthetic fabric, specialty metals, or wool not grown, reprocessed, reused or produced in the U.S. with certain exceptions.
19.	Buy American Procurement of American Goods	Section 707 of P.L. 93-365; see also sec. 604 of the Foreign Assistance Act of 1961, 22 U.S.C. 2354 and sec. 42 of the Foreign Military Sales Act, 22 U.S.C. 2791	No funds appropriated to the DOD may be used to buy other than U.S. manufactured items unless adequate consideration has been given to U.S. firms, labor surplus areas, U.S. small business, the U.S. balance of payments, and certain costs associated with buying foreign; unless otherwise permitted under the Buy American Act.
20.	Preference for United States Manufacturers	16 U.S.C. 560a	To restrict U.S. Forest Service from purchasing twine manufactured from materials of foreign origin.
21.	Buy American Major Components of Naval Vessels	Annual DoD Appropriation Acts under Shipbuilding and Conversion, Navy	Appropriated funds may not be used for the construction of major components of a Navy vessel in a foreign shipyard.
22.	Buy American Navy Ships	Annual DoD Appropriation Acts under Shipbuilding and Conversion, Navy	Appropriated funds shall not be used for the construction of any Navy vessel in a foreign shipyard.

23.	Buy American Acquisition of Busses	Section 404 of P.L. 90-500; see footnote to 10 U.S.C. 2303	Appropriated funds are not available for the purchase or lease of other than U.S. made busses unless under SecDef regulation it is found to be uneconomical or adverse to national interest.
24.	Aid Labor Surplus Area Concerns	Defense Manpower Policy No. 4	Procurement agencies must use their best efforts to award negotiated contracts to contractors within areas classified by the Department of Labor as having relatively high employment to the extent procurement objectives permit; where appropriate, set-asides will be made; with first priority now being given to firms certified by the Department of Labor which agree to hire disadvantaged workers; no price differentials will be paid; firm in such areas shall be solicited in procurements.
25.	Prohibition Against paying price differential (prohibits total set-aside)	Annual DoD Appropriation Acts, e.g., proviso in sec. 823 of P.L. 93-437	No appropriated funds shall be used for the payment of a price differential on contracts made for the purpose of relieving economic dislocations; Comptroller General has interpreted this (40 C.G. 489 (1961)) to prevent total set-asides under the labor distressed area program.)
26.	Aid Small Business	10 U.S.C. sec. 2301	It is the policy of Congress that a fair proportion of the total purchases and contracts made under this chapter be placed with small business concerns.
27.	Aid Small Business	15 U.S.C. sec. 631	It is the policy of Congress that a fair proportion of the total purchases and contracts made under this chapter be placed with small business concerns.

28.	Aid Small Business	15 U.S.C. 637(d)	There shall be established a small business subcontracting program under which contractors are to fairly consider small businesses as subcontractors.
29.	Aid Small Business	15 U.S.C., sec. 644	Small business shall receive any contract which SBA and the contracting agency determine to be (a) in the interest of maintaining or mobilizing full productive capacity, (b) in the interest of war or national defense programs, or (c) in the interest of assuring that a fair proportion of the total purchases and contracts for property and services are placed with small business concerns.
30.	Aid Small Business	15 U.S.C., sec. 637(a) (so-called section 8(a) contracts)	When the Small Business Administration certifies that it can perform a specific contract procurement officer is authorized to award the contract to SBA.
31.	Humane Slaughter Act	7 U.S.C. 1901-1906	To purchase meat only from suppliers who conform to humane slaughter standards.

PREFERENCES

32.	Buy American Research and Development	Section 744 of P.L. 92-570	No R&D contract in connection with a weapons system may be made with a foreign source where there exists a U.S. source equally competent and willing to perform at a lower cost.
33.	Aid Small Business	Annual DoD Appropriation Acts, e.g., sec. 809 of P.L. 93-437	Insofar as practicable, the Sec. of Defense shall assist small business to participate equitably in procurements made with funds appropriated under this Act.
34.	Aid Small Business	15 U.S.C., sec. 637(b)7	Where SBA certifies the capacity or credit of a small business firm, the procuring agency must accept such certification as conclusive.
35.	Recycled Material	P.L. 94-580	Require contractor certification as to use of recycled materials.
36.	Conservation of Energy	P.L. 94-163	Require consideration of energy conservation in selecting contractors.

ENFORCEMENT RESPONSIBILITIES

37.	Labor benefits: Convict Labor	18 U.S.C., sec. 436	All public contracts involving employment of labor shall contain a stipulation forbidding employment of convict labor in the performance of contracts.
38.	Clean Air	Clean Air Act 42 U.S.C., sec. 1857h-4 and E.O. 11738	Federal agencies shall not contract with firms convicted of a violation of this Act for performance in a facility where the offense took place unless a determination is made of a paramount interest of the U.S.
39.	Clean Water	Federal Water Pollution Control Act; 33 U.S.C., sec. 1368 and E.O. 11738	Federal agencies shall not contract with firms convicted of a violation of this Act for performance in a facility where the offense took place unless a determination is made of a paramount interest of the U.S.
40.	Advertising Costs, Prohibition	DoD Appropriation Acts, e.g., sec. 832 of P.L. 93-437	No funds appropriated by this Act shall be available for paying the costs of advertising other than out of profits by any defense contractor, except for recruitment, procurement of scarce items, or disposal of scrap or surplus materials.
41.	Registration by Arms Manufacturers, Importers and Exporters	22 U.S.C., section 1934	Requires every person who engages in manufacturing, exporting or importing arms, ammunition and implements of war to register. Failure to do so may be penalized.
42.	Copeland Act	18 U.S.C., section 874 and 40 U.S.C., section 276c	It is unlawful for anyone to induce any person employed in the construction of public works to give up any part of the compensation

42. Copeland Act, cont'd.		to which he is entitled. Contractors must furnish weekly statements with respect to wages paid employees. Secretary of Labor issues regulations thereunder.
43. Prohibition of kick-back by subcontractor to prime contractor or higher tier subcontractor	41 U.S.C., section 51	Such kick-backs are prohibited under any negotiated contract with the U.S. Amounts paid are recoverable by U.S. from the subcontractor or recipient.
44. Officials not to benefit	41 U.S.C., section 22 and 18 U.S.C., section 431	No member of Congress may share in or receive any benefit from a Government contract.
45. Prohibition on use of funds at educational institutions barring Armed Forces recruiting	Section 606 of P.L. 92-436	No funds appropriated to the Department of Defense by any Act may be used at any institution of higher learning if it is determined that military recruiting personnel are barred by the policy of such institution from its premises. Certain exceptions are provided.
46. Research on human beings	FY 1975 DoD Appropriations Act, section 841	None of the funds appropriated by that Act shall be available for any research involving uninformed or nonvoluntary human beings as experimental subjects.
47. Research on dogs	FY 1975 DoD Appropriation Authorization Act, section 703	No funds authorized to be appropriated by that Act may be used for research or testing of poisonous gases, radioactive material, poisonous chemicals, or biological or chemical warfare agents upon dogs for the purpose of developing such weapons.
48. Care of Laboratory Animals	ASPR 7-303.44	To require humane treatment in use of experimental or laboratory animals.

49.	Compensation of Officers or Employees of Federal Contract Research Centers	Section 407 of P.L. 91-121; 10 U.S.C. 2358 ft. nt.	Appropriated funds shall not be used for payments under contracts with FCRCs for the annual compensation of any officer or employee paid out of any Federal funds which exceed $45,000 except with the approval of Sec.Def. under regulations of the President of the U.S.A.
50.	Government Organization	5 U.S.C. 301-7903	Administrative Procedure Act; Privacy Act; Freedom of Information Act; Employment of Consultants; Authority of Agency Heads.
51.	Gratuities	10 U.S.C.A., section 2207	Requires contract clause providing for termination of contract and other penalties in the event gratuities were offered or given to any officer or employee of the Government with a view toward securing favors in regard to Government contracts.
52.	Contingent Fees	10 U.S.C., section 2306(b)	Contractor must warrant in contract that no person or selling agency has been employed or retained to solicit or obtain such contract for a commission or contingent fee, excepting bona fide employees or selling agencies.
53.	Contracts with Government employees or business organizations controlled by them	ASPR 1-302.6	Contracts shall not be entered into between Government and its employees or business organizations owned or controlled by them except for most compelling reasons as determined by the head of a procuring activity.
54.	Employment of Detective Agencies	5 U.S.C. 3108	Prohibits hiring of employees of Pinkerton Detective Agency or similar organizations.

55.	Procurement of Automatic Data Processing Equipment	40 U.S.C., sec. 759	ADPE for use of federal agencies shall be procured and provided by Administrator of GSA unless he provides otherwise by delegation.
56.	Award of Architect Engineering contracts	Annual Military Construction Authorization Acts, e.g., Section 604 of P.L. 93-552; first appeared in FY 71 MilCon Act (P.L. 91-511). See also 40 U.S.C. 541-544.	Unless otherwise specifically provided by the Congress, architect and engineering contracts "shall continue to be awarded in accordance with preestablished procedures, systems, and practices."
57.	Report of real property transactions to Armed Services Committees	10 U.S.C., sec. 2662	Acquisition of real property over $50,000 or leases of real property in U.S. where the estimated annual rental is in excess of $50,000 may not be made until 30 days after a report of the proposed transaction has been submitted to the Armed Services Committees.
58.	Rate of obligation	DoD Appropriation Acts, e.g., sec. 818 of P.L. 93-437	No more than 20% of the annual appropriations in this Act shall be obligated during the last two months of the fiscal year.
59.	Announcement of contracts	Section 507 of P.L. 91-441; 10 U.S.C. 2304 ft. nt.	No information concerning the identity or location of the person or company awarded a contract by the DoD shall be given to anyone, including any member of Congress, in advance of a public announcement of the award by the SecDef.
60.	Research and Development projects and studies; relevancy to military function or operation	Section 204 of P.L. 91-441; 10 U.S.C. 2358 ft. nt.	No funds authorized to be appropriated to the DoD shall be used to finance any research project or study unless in the opinion of SecDef it has a potential relationship to a military function or operation.

61.	Labor benefits: Equal employment opportunity	Exec. Order 11246 dated 28 Sept 1965 as amended by E.O. 11375 dated 10 Oct 67	With certain exceptions, requires clause in all contracts in which contractors agree not to discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin and to include similar provisions in their subcontracts. Contract may be cancelled for noncompliance.
62.	Women Business Enterprise	E.O. 12138	Require use of procurement to promote women business enterprise.
63.	Labor benefits: Nondiscrimination because of age	Exec. Order 11141 dated 12 Feb 1964 ASPR 12-901, see also P.L. 90-202 (29 U.S.C. 621)	Policy of Government that its contractors and subcontractors shall not in connection with employment discriminate against persons because of their age except upon the basis of a bona fide occupational qualification or statutory requirement.
64.	Labor benefits: Hiring veterans	38 U.S.C., sec. 2012	Contracts and subcontracts for personal property and non-personal services shall contain a provision requiring special emphasis to hiring disabled veterans and veterans of the Vietnam era.
65.	Labor benefits: Hiring handicapped	29 U.S.C., sec. 793	Contracts and subcontracts over $2,500 for personal property and non-personal services must contain provision requiring affirmative action in hiring the qualified handicapped.
66.	Release of Product Information to Consumers	Exec. Order 11566	To encourage dissemination of Government documents containing product information of possible use to consumers.

LABOR STANDARDS

67.	Contract Work Hours and Safety Standards Act	40 U.S.C., sec. 327-332	Every public contract involving the employment of laborers or mechanics shall contain a provision requiring overtime pay for work in excess of 8 hours per day or 40 hours per week.
68.	Davis-Bacon Act	40 U.S.C., sec. 276a	Every contract over $2,000 for construction, alteration or repair of a public work of the United States shall require the weekly payment of prevailing minimum wages to mechanics and laborers as determined by the Secretary of Labor. Contracting Officer may withold sums due contractor and pay directly to the employees where violations occur.
69.	Davis-Bacon Act	40 U.S.C., sec. 276a-1	Requires contract clause which will permit Government to terminate contract when violation is discovered.
70.	Davis-Bacon Act	40 U.S.C., sec. 276a-2	No contract shall be awarded for 3 years to persons appearing on list of violators compiled by Comptroller General.
71.	Fair Labor Standards Act	29 U.S.C., sec. 201-219; ASPR 12-701	Act applies to employees engaged in interstate or foreign commerce and makes provision for wages, hours and conditions of employment. Payments made pursuant to the provisions of the Act are usually reimbursable under cost or cost-plus-a-fixed fee contracts.

72.	Service Contract Act of 1965	41 U.S.C., sec. 351-357	Every contract over $2,500 with certain exceptions (notably contracts which are subject to the Davis-Bacon and Walsh-Healey Acts), the principal purpose of which is to furnish services in the U.S. through the use of service employees as defined therein, shall require (1) the payment of prevailing minimum wages and fringe benefits (or the monetary equivalent thereto as determined by the Secretary of Labor), and (2) the provision of sanitary and safe work facilities. Contract is subject to cancellation in the event of a violation. Also contractor may be debarred for three years.
73.	Walsh-Healey Act (Labor standards in certain contracts)	41 U.S.C., sec. 35-45	Requires clause in all contracts over $10,000 for the manufacture of supplies incorporating by reference the representations and stipulations required by the Act pertaining to minimum wages, maximum hours, labor conditions, etc. Act provides penalties and permits cancellation of the contract and debarment of contractor for three years.
74.	Walsh-Healey Act	41 U.S.C., sec. 40	Upon written finding of head of contracting agency that clause required will impair Government business, Secretary of Labor may make exceptions in specific cases.
75.	Occupational Safety and Health Act	29 U.S.C., sec. 651 et seq.	Provides, among other things, for the Secretary of Labor to establish mandatory occupational safety and health standards in the various industries and to enforce them.

FOREIGN POLICY

76.	Procurement from Communist areas	ASPR 6-401	General policy of DoD that supplies originating from sources within communist controlled areas shall not be acquired for public use, nor shall Government contractors or subcontractors acquire such supplies for use in a Government contract unless there are exceptional situations.
77.	Defense Economic Cooperation with Canada	ASPR 6-501	DoD policy to assure Canadian firms a fair opportunity to share in the production of military equipment and material of mutual interest including research and development. Implementing procedures provide for the alleviation of Buy-American Act restrictions.
78.	Duty-free Entry of Canadian Supplies	ASPR 6-605	To further economic cooperation with Canada and continental defense.
79.	Use of Excess and Near Excess Currency	ASPR 6-000 et seq., FPR 1-6.804-806	To provide preference in award to bidders willing to be paid in excess or near-excess foreign currency.
80.	Nonuse of Foreign Flag Vessels Engaged in Cuban and North Vietnam Trade	ASPR 1-1410	To prohibit contractor from shipping any supplies on foreign flag vessel that has called on Cuban or North Vietnamese port after specific dates.
81.	Buy American Balance of Payments Program	ASPR 6-800	Proposed procurement of supplies for use outside the U.S. shall be restricted to U.S. sources subject to certain exceptions listed in ASPR 6-805.2 (e.g., perishables, small purchases, emergencies, nonavailability in U.S., and unreasonable cost).
82.	Foreign Relations	22 U.S.C. 2351-2572	Encouragement of free enterprise; shipping on U.S. vessels; restrictions on agreements; protection of patents.
83.	Euroatom Cooperative Act of 1958	42 U.S.C. 2291	To provide cooperation with European Atomic Energy Community.

Mr. FUQUA. Gentlemen, we appreciate your summarizing your testimony.

Tuesday, Senator Rudman indicated that your organization would oppose this bill—I am paraphrasing what he said, I think—because it was dominated by big business and you were operating under the guise that you were representing small business, or that there was a large number.

Could you comment on that just to clarify the record, if there is any ambiguity there?

Mr. KNAPP. In my written testimony I point out that we, at least in my segment of the industry—first it is ridiculous that my company is dominated by big business. I am not dominated by anybody. I started my business out of my own back pocket.

I have a great deal of pride and it is a very ego-satisfying thing.

Mr. FUQUA. He was not referring to you personally. He meant the organization was dominated.

Mr. KNAPP. My main competitors are big business and small business, but I don't consider myself to be a classified small business. I think small business in the context of this classification is just a phase that every business goes through and, gentlemen, I expect that Wesper Corp. will go through the small business phase and go into the big business phase and be a Fortune 500 company one day, so any restrictions that are placed on business in general are not favorable to the overall objectives of me as a businessman or my small business peers.

As far as I know, there is no intimation within our organization to take a particular position on any issue other than the Democratic majority rule. At the November board of directors meeting there was a vote unanimously supported by all members of the board of directors which represent 45 of these 1,800 companies to oppose this legislation. In 1980, the small business services committee of our organization took an independent position opposing and asking for moratorium on all set-aside programs until we as an organization could come up with suggested viable alternatives to these types of programs.

In recent news broadcasts such as those on "60 Minutes," which showed how the minority contractor set-aside programs had been so wrought with fraud and deception, where big companies had gerrymandered their organization charts to show small business segments to qualify for different kinds of programs under the current small business considerations in the law, we felt that there would be a more viable, less cumbersome method to motivate, in fact, those segments of the economy that need to be motivated, and through tax stimulation we feel that is the way.

Mr. FUQUA. You mentioned the amount of paperwork that may be involved in here. It was suggested to me the other day by a person that with the mood we have in the country today about getting the Government off people's backs, it didn't appear this legislation was following in that direction.

I wondered if you would comment on that?

Mr. KNAPP. Yes. I think one of the things that bears consideration is when particular Government requirements are imposed on companies, the company's size is not a consideration. So for the large company the volume of paperwork as a percentage of the total effort of that company is quite low, but when a small company enters into these various programs—and I could go down a number that we are involved in right now, since some of our private debenture holdings are SBIR's, we are required to file certain SBA paperwork.

As a Government subcontractor, the DCASR paperwork is a burden to us. The same amount of paperwork is required of all companies. Size doesn't enter into it. So the percentage of effort I have to go through to comply with Government regulations is much greater than the large companies. Yet through a tax credit program that is the same exact paperwork that I go through to file my corporate taxes so that doesn't really create a burden for me.

Mr. FUQUA. In the hearing yesterday testimony was heard from several organizations that represent the university community and basic research groups. I am addressing this to both of you. Their concern was expressed with the impact this might have on basic research as compared to what you have talked about—venture capital and high technology companies merging.

How many companies are out there that are in basic research that are classified as small companies, and I am talking in the generic sense of basic research.

Mr. ZSCHAU. I don't feel I am an expert on that, but I do feel when you talk about basic research you are really referring to high energy physics or plasma physics or fundamental drug research——

Mr. FUQUA. We have the National Science Foundation and certain NASA basic research programs.

Mr. ZSCHAU. My hunch would be, based upon my experience, that there aren't many small companies who specialize in basic research but rather take the results of that research and use them in some commercial or perhaps noncommercial way.

But I really should say I am not an expert on the answer to that particular question.

Mr. FUQUA. Would you like to comment, Mr. Knapp?

Mr. KNAPP. Dr. Zschau is more of an expert than I am, so I guess that places me another level down.

I tend to agree that the small entrepreneurial effort is economically motivated so the level of research and development within our small, high technology companies is oriented toward a profitable product and not toward the establishment of a new science.

Mr. MCCLOSKEY. Mr. Chairman, could I comment on that?

Mr. FUQUA. Yes.

Mr. MCCLOSKEY. I represent not only the headquarters of the AEA in Palo Alto, but Stanford University, which has one of the basic science reserach facilities, the accelerator.

Mr. FUQUA. Mr. Kennedy testified to this yesterday.

Mr. MCCLOSKEY. Piet Panofsky, the director of the Stanford Linear Accelerator Center [SLAC], has $65 million in his budget, and 19 percent of that budget is let out to small businesses. So the 19 percent there and the 6.8 percent that goes to small businesses anyway, would not indicate small business is being hurt on that point.

Mr. FUQUA. In the testimony of both of you you suggest that this legislation probably comes at a—probably that its time has already passed.

My question is, Why do you believe that this legislation should receive such strong support all over the country?

Mr. ZSCHAU. Mr. Chairman, let me respond to that. I believe the information on the availability of risk capital is not widely known. The phenomenon of the passage of the reduction in the capital gains tax in 1978 was not expected to have such an extraordinary result and the information on the availability of capital is relatively recent.

Mr. FUQUA. Do you think this legislation would help create more risk capital?

Mr. ZSCHAU. I don't believe this legislation would do anything to create more risk capital.

I also feel that everybody wants to support small business and everybody wants to support technological innovation and therefore when you have a small business technological innovation bill it is difficult to be against it.

I am against it because I don't believe there is a need and because I don't believe it would result in an efficient use of the Federal R. & D. dollars.

I guess I am therefore against it as a citizen wanting to see those dollars spent in the best possible way.

Mr. FUQUA. Mr. Shamansky?

Mr. SHAMANSKY. Thank you, Mr. Chairman.

In Columbus, Ohio, part of which I represent, we have Ohio State University and there is a professor there very much interested in entrepreneurship, the small entrepreneur. His contention was the venture capital firms really provide money for companies which are already established and not for the individual who is starting out in the back pocket—from his own back pocket—as Mr. Knapp did.

My question is, in looking over your figures, can you comment—has there, in your opinion—I am talking to Dr. Zschau principally, but the other gentleman may respond—has there been verifiable, decent data regarding sufficient risk capital for the individual to start off?

Mr. ZSCHAU. We have some data that addresses that question. You are absolutely right.

Getting capital at all was difficult. Getting it for a startup was almost impossible. The level of risk in the enterprise was just too high to attract that scarce capital. But as more capital has become available, the percentage of startups that are being done has increased. The specifics on that are, in 1978, only 20 percent of the venture capital deals that were done in this country, investments, were for startup companies. This last year, 1981, that was doubled. About 40 percent of the venture capital deals were for startup companies, and my prediction would be as more capital becomes available and the established companies are finding lots of people to finance them, the venture capital investor is looking for the startups as the way to achieve the kind of returns that he wants.

We have already seen a doubling in the number of deals being done for startup companies and will see a continued increase.

Mr. **Shamansky**. Do you have any data on the number and amounts of individuals lending for startup as distinguisehd from venture capital firms? Is there any way of getting a handle on that?

Mr. **Zschau**. I think it is very difficult. There are two ways in which individuals participate in venture capital. One is by putting their money into the venture capital firms and the other is to make an independent investment which may be in the form of an R. & D. partnership.

Mr. **Shamansky**. I am talking about the direct investment and not venture capital.

Mr. **Zschau**. Yes, the direct investment.

What we have seen is that direct investments by individuals through the R. & D. partnership approach has gone from nothing to $170 million in 1981, but I don't have any specific data on how many individuals, apart from venture capital firms and who are not in R. & D. partnerships, are making major investments.

Mr. **Knapp**. I would like to comment on your question because WesperCorp is not the first venture I have been involved in. I have been involved in four startup business situations in which two of them were internally financed by the founders and one was financed by a venture capital firm that indeed is the one that was involved in Mr. Zschau's company, and they funded that venture right from the beginning.

This was in the early seventies.

What happened, in our case, we would have been more than willing to go to the venture capitalists in 1975, except the investment capital had been redirected in other areas so there just wasn't a viability of funds.

Those reports—that condition which has been referred to today as a justification for this bill, really was a condition that existed in 1975 and 1978, during those years. 1975 through 1977, which existed prior to the capital gains tax reduction.

As soon as that turned around, then venture capital became really available.

One more point: We don't suggest that venture capitalists will ever invest in a startup venture that isn't a sound business investment. We wouldn't want that because it deteriorates the basic fiber of our enterprise system, and we wouldn't suggest that any legislation be passed that funds a bad business venture as well.

Mr. **Shamansky**. My last question will be, what evidence is there that the entrepreneur, the individual who wants to start new venture, a new business, to get away from the use venture, is not finding sufficient capital today, that there is not enough risk capital from either one of these companies or from an individual who is willing to, I will say, gamble in this sense, an intelligent risk taker.

Mr. **Knapp**. We have no evidence there is not capital available. In fact, based on the number of spinoffs from our company, I would say there is plenty of capital available to start companies.

Mr. **Shamansky**. Dr. Zschau, would you have any comment on that?

Mr. **Zschau**. Well, you don't have to drive around the Sunnyvale/Silicon Valley area very long to get the feeling that they are literally sprouting out of nowhere. The number of firms that are being started up these days, in spite of difficult economic times, is phenomenal.

That is not to say there will not be firms that can't get capital or that there won't be projects that won't be funded, but I really believe that the amount of capital, which is available and which continues to pour in, has dramatically changed the situation from the mid-to-late seventies, when the concern was great that small businesses weren't being financed, to today when large numbers are being financed.

Mr. **McCloskey**. Could I add one response to that?

We will get the numbers of individuals from the venture capital firms that are participating. I will try to submit it by a letter, but I would like to say that David Packard, who served as Under Secretary of Defense, one of the two founders of Hewlett-Packard Corp., does 20 percent of his company's business with the Government. Some of the best of these firms who might be granted, say, a $50,000 R. & D. contract or a $100,000 R. & D. contract might tell you, as David Packard has testified here, that they would prefer not to do business with the Government because of the paperwork requirements involved. It is the addition of the paperwork requirements—this would be the 84th type of set-aside that a Government procurement office would now impose on applicants for grants—that just throttles small business.

I once ran a law firm and I had to expand from 1 lawyer to 10 lawyers because only if I had 10 lawyers could I afford the accountants to comply with the paperwork requirements.

I think the thrust of Mr. Knapp's testimony is that small businessmen do not want this kind of imposition because it merely adds to the overhead they have to pay to get the Government grant.

We once found in the applications for the Department of Education grants, for example, we had 50 applicants for a $50,000 grant. It cost $2,000 in preparation of the application in each case so that 50 school districts spent $100,000 so that one of them could get a $50,000 grant.

When you ask why this thing passed the Senate 90 to nothing, I would suggest that anything the Senate does unanimously means somebody really hasn't taken a careful look at it.

I hope we can change that some day, but a 90 to nothing vote in the Senate should not overwhelm the House of Representatives, in my judgment.

Mr. **Shamansky**. Thank you, Mr. Chairman.

Mr. **Fuqua**. Thank you, Mr. Shamansky.

Mr. Brown?

Mr. **Brown**. Thank you, Mr. Chairman.

I want to commend both of you gentlemen for the presentations you have made, and our esteemed colleague, Mr. McCloskey, I hope he will be able to change the complexion of the Senate a little bit in the near future.

I am rather struck by the testimony which both of you seem to agree upon, that there is an adequate amount of risk capital for high technology small business.

I think you, Dr. Zschau, attribute that in part to the reduction in the capital gains rate passed in 1978, in the Revenue Act, at that time. The paper that you have submitted looks like it confirms the validity of supply-side economics, that the tax return after the reduction in rate was greater than it was before.

You are relatively confident of that situation?

Mr. ZSCHAU. Well, my testimony did not refer to the tax receipts but the Treasury has done studies after the passage of the 1978 capital gains tax reduction and the data—and I don't have it at my fingertips—is that prior to 1978 we were collecting about $7.2 billion in tax revenues from capital gains. In the first year after the capital gains tax was reduced, we collected about $10 billion in capital gains tax revenues, so the tax revenues went up even though the rate went down.

Mr. BROWN. That wasn't in the testimony, but in the papers you submitted with your testimony?

Mr. ZSCHAU. Yes. Thank you.

Mr. BROWN. That, of course, should be further accelerated by the changes made in last year's tax revisions I would assume?

Mr. ZSCHAU. Yes.

Mr. BROWN. The question that I have and the one, of course, that relates to, I think, the primary motivation behind this bill is, with this additional availability of capital, with the beneficial results to the Treasury and so on, what about the impact on employment in this sector and on the general status of the country's economy which seem to be continuing to decline?

Can we assume that this is still not an adequate solution to our overall economic problems or that the small high technology business sector, or component of the economy, even dissipate these indexes of renewed help, is too small to have a major impact on our total economic picture?

What kind of an explanation do we have here?

Mr. ZSCHAU. Even though I have some pet theories about the economy, I would hate to represent myself as an expert on what needs to be done.

The economy is not just high technology and small business as you know. Also, the recession we are currently in appears to be affected dramatically by the automobile and the housing industries, which are sensitive to high interest rates.

Mr. BROWN. In other words, these are more than offsetting the gains in the small business, high technology sector, is that the thrust of what you are saying?

Mr. ZSCHAU. Absolutely, but in terms of employment opportunities in our industry, the electronics industry, we continue to grow at a rapid rate. Our company has over the last year grown in total employment from about 300 to 450 people. This is during 1981 when times were difficult.

Our sales grew by about 60 percent. That is because in the electronic industry there are many kinds of cost advantages to buying the products which, when the companies are tight on cash, make our products more attractive.

Mr. KNAPP. I might answer to a degree.

First, it would be nice if the result of the cure instantly followed the medicine, but it is not true.

Once you take the medicine, it takes a little while for the headache to go away. We have now taken the medicine. We see our industry growing. WesperCorp itself happens to have been listed as one of the hundred fastest growing companies in the country; as documented in Inc. magazine's 100 companies, we grew last year 47 percent.

We increased employment by 0 percent, but over that our productivity went up from $103 to $113 thousand per employee. That is gross sales per employee. In fact that number is significant for a healthy growth business in today's economy.

So I think that the small high technology companies that are now emerging and growing, through the efforts that you gentlemen have made in the past 4 or 5 years, are really going to start bearing results and we are starting to see some of that.

In answer to your question, have you done all that can be done, well, I suppose you never reach the absolute ideal of your requirement because it turns out my ideal is different than Dr. Zschau's, but in fact we are starting to return to an environment that cultivates this type of entrepreneurial innovation and we probably do need to do things further.

I think some of the things, although well-meaning, aren't really taking us in the right direction and that is why we are here today.

Mr. **Brown**. All right, I am going to let that rest and we hope the record will reflect adequate support for your contention that we have done what is necessary to stimulate the small business, high technology sector in terms of taxes and capital accumulation and so on.

I want to raise another question and ask you to comment on that.

It has been repeatedly said before this committee that one of the factors involving our global competitive posture is the fact that other countries have an ability to focus on targets within new market areas and to concentrate resources on a national basis behind those targets.

This has been repeatedly stressed about Japan. There was a recent article about France establishing a world center for research and development in telecommunications and computers and intending to increase the market there.

I saw a newspaper story yesterday that the Canadian people are joining with an American firm to begin to establish a telex system in Los Angeles and other market centers and they focused on this as a systems problem. We seem to lack the capability of doing that.

We have before this committee legislation that is intended to facilitate some form of policy concentration of this sort.

Could you comment, each of you, as to whether this might be a desirable initiative or whether this is too far contrary to the spirit of this administration or to the needs of our economy to be successful?

Mr. **Knapp**. I could probably take about 3 hours and comment on that subject. It is a complex subject.

You are certainly probably more aware than we are of that.

It turns out there are some basic issues involved in how we relate in an international market. WesperCorp does about 16 percent of the business internationally through all the developed countries of the world and we find that the current antitrust laws that exist prevent us from effectively competing with our foreign competitor and my position is, if we are allowed the ability to freely compete with these foreign competitors, this country has the strongest and the most energetic resource in the world and that is in its people. We are the highest motivated people in this world and all we need is the freedom to go get them and we will take them down to their knees.

We are currently frustrated by our inability to do business as business is done in the world.

Now, I am not suggesting we go out and flagrantly break laws and destroy our ideals and moral fiber to do business, but restrictions placed on us create a very difficult problem in freely competing in the environment.

I think that combinations of companies to go out and compete with the foreign threats, as those foreign companies do, should be allowed under the law. I think that an alliance on the basic integrity of American business needs to be established in this country. There is integrity in our minds as businessmen.

In answer to your question, everything that can be done to encourage free competition from American industry on an international basis certainly hasn't been done. In fact, quite to the contrary.

But I think there are enough people aware of the problem so that we are going to be doing some dramatic things in the future in alleviating that situation, but, believe me, the greatest competition we have in the foreign markets is not from outside; it is from the controls and restrictions that we have within.

Mr. **Brown**. Would you comment on that?

Mr. **Zschau**. Thank you, Mr. Brown.

I would say it distresses me a lot to see people in business wringing their hands and getting an inferiority complex when they see the Japanese threat.

I believe that we have the capability in this country to compete if the environment is correct. We have seen some changes in that economic environment. The incentives to take risks have increased over the last several years. I believe we should continue to follow that approach rather than a central planning approach.

On the other hand, I think there are basic research activities which are not attractive enough to any private company. Those are the ones that the Federal Government should fund. These are the activities that are generally done in research organizations, universities, nonprofit research organizations. They typically take a lot of equipment. It may be a long-term program because it is so far from implementation, and if the Federal Government is focusing on the basic research primarily and allowing the free enterprise system incentives to encourage people to take the risk to take that research in its raw form and transform it into commercial products, this country will be able to stand up in the world markets to any other country.

Mr. **Brown**. We appreciate this testimony as to the importance of basic research which may be in some trouble at the present time—Government funded basic research. But I am not sure that is the whole answer. I will not follow this up particularly because I have used up my time, but would you say that the change in the antitrust climate in this administration, as evidenced by the dropping of the IBM suit, for example, will enable IBM and other U.S. companies to begin to regain the market shares they have lost over the last decade or longer in international competition?

Mr. **Zschau**. My hunch is that that would be correct, but I don't consider myself an expert on what the impact of the IBM suit being dropped would be.

Mr. **Brown**. Thank you.

Mr. **Fuqua**. Thank you, Mr. Brown.

Mr. Walgren?

Mr. **Walgren**. Thank you, Mr. Chairman.

I just noticed one thrust of your testimony, Dr. Zschau, about the public funds, or when Federal funds are involved in a program, drying up the inflow of private capital.

Now, that is a point that a witness made yesterday and we didn't really have the opportunity to explore it that much. Can you develop that for me?

Mr. **Zschau**. I don't believe that I made that point in the testimony.

What I suggested is if there was an overabundance of Federal funds being mandated to be spent on small companies there would be an effect of crowding out some of the private capital. That is, the private capital sources would not be able to make the investments because the investments would be made by or the funding would come from Federal sources. That doesn't say that private capital would dry up; it just wouldn't be able to make the investment because of the competition.

If a company can get money from the Federal Government without selling any stock or paying any interest on it, the company will take that money rather than go to the private sources that require some sort of equity or interest payment for it.

I made a call to one of the companies listed in the committee report that was a company funded by the SBIR program and I asked the president of that company, "Was the money that you received from the NSF, SBIR program, significant for you?" He answered, "Yes, it was very significant. It helped finance us."

I asked a second question which perhaps the NSF did not ask the recipient. "Could you have gotten the money if you didn't get it from NSF?" He said, "Of course. What it would have meant though is, we would have had to sell more stock, but why sell stock when you can get free money from the Government?"

When we make these fundings of young companies and point to their successes, we relate that to the efficacy of the Federal funding program. But we have to ask the question: Could it have been done by private sources or was it necessary to use the taxpayer's dollar to fund that project?

Mr. **Walgren**. I don't have too much experience in that area at all, but I have, in talking to several individuals, noticed there are instances where people will come forward and say, I cannot get funding, when the truth of it is they are unwilling to give up any of the return on the product to an investor who would go along with them.

I suppose it is true he cannot get funding on his terms, but that isn't to say that the private sector might not more efficiently be able to pick up that product and in fact bring forces to bear that would maximize its usefulness for the society as a whole if it were funded in the private sector as opposed to being held closely by that one individual, unwilling to take on a partner, or help.

You both indicated or I am sure you both agree on the importance of basic research. The Senate has added an amendment which we all support and it will be offered in this committee too, which essentially tries to protect the basic research function of some Government expenditures and tries to set aside basic research.

Yesterday witnesses said that it is very difficult to define basic versus applied research.

My question is, if we can't define it, can we protect it? Do you feel there is a difficulty in defining basic versus applied research?

Mr. KNAPP. No, I don't feel—obviously if you want to resolve it down to a millionth of a part, there might be difficulty in drawing that line, but fundamentally basic research is that which is not dedicated to a profitable product result.

Intermediate research or product research is that which is dedicated toward a product which will be generated based on that research and generate a profit for those people involved in that research effort.

Mr. WALGREN. Can you take that definition and apply it to, let's say, NIH, or research conducted by NSF, the agencies to which we are going to apply this definition?

My instinct is that so much research in which the Government is involved is not really directed toward a profit and therefore that definition would be hard to apply in order to protect the undirected side of research.

Mr. KNAPP. As related to the particular individuals that we are discussing here, and that is the small entrepreneurial contractors of that research, that research does in fact generate a profitable product. The product being some effort that they perform at a profit for their customer, the Government; whether it be NSF, DOD, or whatever.

So in fact that research has a profitable end, but basic fundamental research is the type of research we are talking about that is conducted at institutions like MIT and the University of California and Stanford at the linear accelerator, where there is not an end, profitable result based on that contracted service.

Mr. WALGREN. Let me give you my concern and maybe you can allay my apprehension.

It seems to me the problem with basic research, even within the Government, is that it has no immediate political constituency. It would have no defender other than perhaps the Administrator of the program, and therefore if an agency was asked to set aside *x* number of dollars from its research budget and it looked at its range of research and it found nine-tenths of it which had immediate constituents in there arguing, you can't cut this because my firm is involved in it and it is valuable, and you have a relationship with me and we are friends, and don't cut that.

Then you come over to the basic research or the more undirected side of it and you find a researcher out there with nobody standing up and saying, you can't cut this, other than perhaps the Federal employee doing the research.

There is no one particularly interested in that in any shortrun sense of the word and would not a Federal bureaucrat under those circumstances say, well, gentlemen, I have to cut my budget to set aside this money so we will just define this basic research as applied and then cut it, and we will not have cut any basic research and in the Congress sense of the word we would have protected basic research, but the result would be a loss in that function.

Is that a real concern?

Mr. ZSCHAU. I share your concern and I have to say to my colleague, Mr. Knapp, that I don't share his confidence in being able to define as precisely as he may have suggested the difference or the dividing line between basic and applied research.

However, I think you have hit on a point there that not only relates to the fuzziness of the boundary, but also the political realities of the program such as we are discussing.

Mr. WALGREN. Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. Walgren.

Mr. Gore?

Mr. GORE. Thank you very much, Mr. Chairman.

I want to welcome our witnesses here today but I must say I am a little bit puzzled by the testimony and some of the assumptions that appear to be built into the testimony and I want to explore it a little bit.

First, let me say we just compiled the record of hearings of 2 days in last July before the Subcommittee on Investigations and Oversight that looked extensively at the SBIR program and we have several panels of innovaters, inventers and people who had tried to make it in the venture capital market, people who have had success in the SBIR program.

We found this program is an unqualified success, an unqualified success. We found that there is a tremendous potential in this country that is going largely untapped by insisting that bright, innovative geniuses associate themselves with either large universities or large corporations in order to translate—in order to pursue their imaginations and in order to develop their ideas.

We are thereby denying ourselves of the fruits of perhaps our greatest asset.

I had dinner last night with Dr. Arno Penzias now vice president of research for Bell Labs, a Nobel Prize winner who confirmed the nature of the origin of the universe, the big bang theory, and also in addition to being a cosmologist and astronomer and physicist, he discussed the hand wringing that you referred to, Dr. Zschau, all too often in this country about looking at the Japanese onslaught and wondering what we can do about it.

He says we are going to win, and the reason we are going to win is our asset, our independence, and independent thinking. But we have got to encourage those people and we have to nurture that asset. He said the most important thing we have to do is make the long buck respectable again. You talk about these tax breaks. What about the interest rates? You know people look at 20 percent effective interest rates. They are not putting their money into some R. & D. idea. My gosh, they are turning it over as fast as they possibly can. They are taking an invention already on the shelf and painting it with polka dots and trying to increase the price.

I mean we are destroying the very strongest asset this country has.

Now, the discussion earlier about venture capital. You know, these hearings I referred to demonstrated that historically venture capital firms have invested only 10 to 15 percent of their funds in startup because of the high risk.

But startups are not what we are talking about in this program. Now that figure may have increased due to the tax law changes. I hope that that is the case, but startups only occur after there is a prototype and a market ascertained.

That is not what we are talking about here. It seems to me you all have been discussing a program that is totally different from the one that is envisioned here.

No venture capital firm is going to fund a research idea. It is too risky.

The SBIR statement does precisely that. You had an eloquent statement a little while ago about increasing basic R. & D. When you have something marketable, then go to the venture capital market. It is precisely what this program does.

I think your testimony can be taken as an eloquent statement in support of this legislation if you look at the basic outlines of what is actually involved because tax incentives at this early stage are not incentives to the entrepreneur.

You mentioned free money in reference to this. I want you to know, and I feel that you may already, that very strict peer review of the ideas involved here is required before the ideas get any funding, and you seem to be operating on the assumption, both of you, that this is a procurement program. It is not.

It is just not a procurement program. The participants are not contractors. The program solicits ideas of interest to the Federal Government. It is not a Government-funded program for commercialization.

Phase I and phase II reports are research reports. Very few developed prototype. Now, what venture capital is going to finance a research report? They are just not going to do it; not even if the interest rates were back down to sane levels.

Now, the SBIR program at the same time is using the simplest, shortest form possible. Paperwork hasn't been a problem in this program.

One of the reasons it has been such an unqualified success is that.

Now, the challenge we are facing in this country is awesome and I just think we have to tape these independent-minded people.

Dr. Penzias talked about the guy who invented the laser. He had the idea just in conceptual form. He wanted to work on it. He said, I need 10 people to help me with this for a few months.

Bell Labs said, you can have two. He said, OK, I quit.

He did. He went out and invented it on his own.

If they had 20 percent interest rates at the time he tried to do that, it would have been impossible, and we wouldn't have had the laser because he couldn't live within the confines of this big institution.

All academic institutions and corporate institutions have very many shared characteristics.

First of all, let me ask if either one of you has seen this document here? Have either one of you read it?

Mr. **Zschau**. I have not read it.

Mr. **Knapp**. I have seen it, but I haven't reviewed it.

Mr. **Gore**. I thought from reading your testimony, it just occurred to me that this was probably the case, that neither one of you have really read this. This is the outline of the SBIR program upon which the whole thing is based, and I can understand if you hadn't seen this how you could come up with some of the misconceptions that appear in your statements.

Let me take a few of them quickly.

Dr. Zschau, on page 4 you give this column about the estimated venture capital funding, investment made by venture capital firms and young companies and you have the whole list there.

How many of those were for R. & D. ideas?

Mr. **Zschau**. I don't have the answer to the question.

Mr. **Gore**. Do you know of a single one that was for an R. & D. idea?

Mr. **Zschau**. Absolutely. My own company did the development of a fundamental imaging technology, an ink jet printing technology. From the very beginning we filed for and received the basic patents on that technology. We did it on our own with a small amount of venture funding. When we started we had nothing but the concept; nothing at all but the concept.

In order to get it financed, however, in the midseventies, we had to go to Japan because there was a scarcity of capital in this country. We wouldn't have to do that today.

Other companies like mine don't have to do it today but we did then.

Mr. **Gore**. How many employees do you have?

Mr. **Zschau**. Currently we have 400 in the United States and about 57 outside the United States.

Mr. **Gore**. How many did you have at that time?

Mr. **Zschau**. At that time we had less than 200. We had about 80 employees in 1974.

Mr. **Gore**. Now, on page 7—first of all, you don't know how many—certainly of the 450 in 1969—I mean what would it be, a dozen?

Mr. **Zschau**. Let's just take another example. You used the example of the laser. The microprocessor, which you see in your watches, in your appliances, and in calculators, was developed by a company, INTEL Corp., started in 1968. Bob Noyes, the chairman of that company, was the inventor. He left Fairchild Semiconductor to found INTEL. That was done with venture capital at that time, at a time when more venture capital was available. Then, due to the tax law changes in 1969, venture capital dried up. That was an example of a fundamental technological breakthrough that occurred as a result of venture capital investors.

Mr. **Gore**. No doubt there are rare instances where R. & D. ideas in small businesses can attract this kind of support, but the numbers you cite I would just suggest for the record, really aren't relevant to the legislation under discussion.

Let me go to page 9. You say that the average grant in the NSF program was $18,531. Where does that figure come from?

Mr. Zschau. That is in error and I apologize to the committee for that. I had meant in my prepared remarks, if I had time to talk about that, to indicate that I received incorrect information and that I intend to submit to the committee a new analysis based upon correct data. I apologize for that error.

Mr. Gore. The entire analysis which follows page 9, it is all off, right?

Mr. Zschau. Yes. Please disregard that analysis. My hunch is if the correct number were used, we would find rather than about 10,000 proposals, something like 3,000 to 5,000 proposals. I apologize again and I will do my best to correct that.

Mr. Gore. Mistakes happen. We will just disregard that.

Now, on page 8 you state that bad deals would be funded and abuses would be encouraged. I want you to give me one example of an abuse in the NSF-SBIR program upon which this is based.

Mr. Zschau. I am referring to what occurs when you have too much money and Federal employees who are measured on spending the money rather than getting the results.

Mr. Gore. That is not the way this works. That is not the way this program works.

Mr. Zschau. When you have a mandated target to spend a certain percentage of the Federal R. & D. budget on an SBIR program, I can't beleive that it won't be spent and it will be spent somehow even though it may be too much money for too few proposals.

Mr. Gore. You have a situation where you are flooded with excellent R. & D. proposals and a strict peer review process to select those that are superior in nature and quality and then a phase 1, phase 2 and phase 3 process to weed them out along the way.

Can you cite a single example of an abuse under the SBIR program?

Mr. Zschau. An abuse would be the wrong word, but I cited in prior testimony here this morning an example where the funding was not necessary to come from the Federal Government. The president of the company—that company is Omex, one of the companies mentioned in the record told me that had the money not come from the NSF program, it would have come from private sources. It was a matter of whether to get it without any strings attached from the NSF or whether to get it from private sources and having to sell stock and pay interest for it.

Mr. Gore. Well, that was a success, wasn't it? I mean, that worked out very well for them and for the country?

Mr. Zschau. The fundamental question, Mr. Gore, is whether or not it was necessary to spend taxpayers' money to make that success or whether it could have come from the private sector.

Mr. Gore. well, I think that in today's work environment where we are on the defensive and backpedaling around the world—just look at what France announced yesterday within the computer industry, the world computer center.

Japan, West Germany. I don't think we are in danger of doing too much.

I think that this 1 percent—and I am offering an amendment to cut it back to 1 percent—you know, I just think that it is little enough.

You said on page 7, NSF has funded 286 proposals with a total of $5.3 million; is that correct?

Mr. ZSCHAU. That is the source of the error. That is also an error and that is the source of the error I referred to earlier.

Mr. GORE. We can disregard everything from page 7 on.

Mr. ZSCHAU. I will submit, with the committee's permission, a correction to those numbers.

Mr. GORE. Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. Gore.

Mr. Lundine.

Mr. LUNDINE. Thank you, Mr. Chairman.

Gentlemen, your testimony has been very interesting. It strikes me that anyone who advocates a set-aside for virtually anything has got the burden of proof.

I don't think most of us who are very thoughtful about Federal activity instinctively like set-asides because presumably they are a distortion of efficiency, if we can presume there is any efficiency to any Federal activity.

Yesterday I had the opportunity to visit with one of America's distinguished scientists and engineers. He made the point that small firms tend to be better at product innovation, whereas large firms, even those who have grown from a small innovator, tend to be better at process innovation because the large firm tends to look at a new product as just disturbing the inherent efficiency in the way they crank out whatever it is they are producing, and for all the research laboratories funded by the larger firms, that they really do not tend to be at the cutting edge of new product technology because the smaller firms, such as you have experience with, tend to look for a new market share that may not even exist at the time they are in the development stage, whereas the larger firm has to weigh it against the expected capital costs they have to produce whatever it is. I hate to pick an example, but to use the example of IBM's ball typewriter, that they produce so well—that even if they knew another way to produce a typewriter they would be inclined not to push it too hard because they are good at what they are doing currently.

I have two questions. Do you agree with the general observation? Second, if that is so, when set-asides are the answer, on the other hand, wouldn't it be prudent for the Federal Government in investing its research dollars at least to have some concern that we are not overlooking when we are sponsoring research designed to produce new products—I mean ultimately designed to introduce new products—to be sure that we are not overlooking the small firm innovator?

Mr. KNAPP. Well, the first question, I don't really agree that innovation is naturally more healthfully generated in a small R. & D. environment. I think we can point to a number of examples, and so can you, where small firms have generated a dramatic technological innovation.

I think Land is a good example of a commercial innovation that probably did all right for himself and several of his shareholders.

Mr. LUNDINE. Maybe I didn't make my point clear, but Land was very small when he started.

Mr. KNAPP. I am saying—my position is that I don't think the environment, whether it be large or small, is necessarily a qualification for where the innovation comes from.

Bell Labs, for instance, without developing the transistor, certainly couldn't—this whole technological thrust into information processing couldn't have occurred. The efforts of large companies like Beckman, Texas Industries, and Fairchild built the integrated circuit.

Again, another valuable tool for companies like Mills who use those as a basic raw material for our products.

Again, the environment is really dependent on the climate, not the size of the organization that one finds himself in, to innovate.

I happen to have been involved in the innovative process in developing optical scanning for bar code, which is an incidental thing but probably the grocery industry would find itself bogged down in its ability to move its product to the consumer if it wasn't for the universal product code.

I did that at the University of California. So, again, I am not sure that it necessarily requires a small company for somebody to create an innovative breakthrough.

Would you phrase your second question again, please?

Mr. LUNDINE. If the first one is negative, you need not go to the second one. I said, if that—of course, you have overstated my assertion. My assertion was not that innovations never come from large companies, but that many of them, or most of them, tend to come from the smaller firms.

I said, if that is so, wouldn't it be in the Federal interest to try to design some way to assure that the smaller firms are getting some crack at the research dollar? That is to say, that we are not overlooking them completely?

Mr. KNAPP. Let me go a little bit away from your question and say that from an acorn a mighty oak grows and so, in other words, for us to continue the economic development of the free enterprise system in this country there has to be small innovative startup companies that generate into the giants that we see today, such as IBM and other high-technology companies.

So we, as a society, certainly you in your role and myself as the president of a successful venture that I hope one day will be a large company, do have a responsibility for nurturing that motivation which is the spirit and the basic fundamental root of our free enterprise system.

Yes; we need to be very conscious of that. We need to work diligently as a team to see that that fiber isn't broken—that chain of control in the system isn't broken, and that is why we are here today.

We are just suggesting that set-asides aren't necessarily the most efficient way to achieve that. It creates a lot of side effects that we feel are not beneficial.

Again, I would also like to respond to the question that has been raised about the NSF and SBIR programs. Can we find problems in those programs? Well, we haven't found problems, but Milton Stewart apparently found problems, because in his magazine article in August 1981, he pointed out that a small company satisfied a phase D1 grant and then it was 15 months late in receiving the phase 2.

Now, if I am running a small enterprise largely dependent on that grant and I don't get any funding for 15 months, I am out of business. It is as simple as that.

So there are problems in allocating funds through a massive structure and getting it to these highly responsive, very thinly financed organizations.

Mr. LUNDINE. Speaking of finances, I would like to ask one other question. I really appreciate your testimony and I am delighted to hear your observation about the availability of Venture Capital and that a couple of tax bills I voted for have created a better environment, but I wonder if, in your analysis, or our discussions—let's put it that way—we might be confusing financing small business with the question of research and where research should be sponsored and carried out.

In other words, I thought it was a very good point that some small business didn't want to dilute its equity and sell additional stock, but I am not so sure that that proves that that small business shouldn't have gotten a research grant.

I mean, if they do the research better than anyone else—that is likewise true of a large business. Westinghouse gets huge research contracts from the Federal Government. Presumably they could get the money someplace else in many cases, but they either don't want to borrow it or they don't want to dilute their equity and I don't see anything—I sort of suggested there was something fundamentally wrong with that.

I don't think there is because even the Federal Government might have an interest in making sure that small firms aren't forced to dilute equity so that they have the incentive as owner-managers, to go forward, to push to the very limit the kind of innovation.

Now, I would be upset if you were to tell me that research could have been done better, more efficiently or more thoroughly by someone else. But are we not really talking, in the bill under consideration here, about who should get Federal research dollars, such dollars as are available, rather than how we should finance business?

Mr. KNAPP. Yes, we are and, as a matter of fact, we are not suggesting the Government discriminate against us as small businessmen in granting research contracts.

If we are a qualified bidder and we have the necessary resources, then we think we should be considered along with any other proposal that is submitted by the Government for that particular segment of business which they are contracting out.

Mr. LUNDINE. Maybe what we ought to be directing our attention to, particularly bearing in mind the comment of our colleague, Mr. McCloskey, is how to cut down on some of the paperwork and some of the burdens that small firms can't as easily meet as large firms that do a lot of research with the Federal Government.

What do you think of that?

Mr. KNAPP. This is an assistance program rather than a mandated set-aside.

Mr. FUQUA. Thank you, Mr. Lundine.

Mrs. Heckler.

Mrs. HECKLER. I think this has been very interesting. We covered so many subjects. I was fascinated by some of your comments, Mr. Knapp.

I wish we could go into the whole Japanese question, because normally at our hearings, we have a number of Japanese visitors. It is quite common to see a large number of visitors from Japan.

They are very interested in what is happening in the science and technology field, as we know.

It is the perspective you offer on our competitive position that differs from what I hear from leading businessmen who are in the same field, so that is a very intriguing area.

However, to get to the service at hand, which is of great concern, there is a dichotomy, again, between your testimony and that offered by what will come forward from the Small Business Association of New England and I just wonder if your organization, which I very much respect for its ability at a time when I think the Congress is responding to the needs of the free enterprise system quite effectively, and I see too little of the entrepreneurial spirit that has made America great and I think somehow there are those who are not willing to take the risks, who want even further guarantees from the Government at the very highest levels. Not the very small companies, but the very large companies.

I raised this issue with Secretary Regan yesterday because I believe in the entrepreneurial spirit, I do believe in free enterprise. I do believe, frankly, that we have strangled the economy in many ways and that is one of the reasons for our economic doldrums.

The question is, since we are in an antiregulatory mood and quite appropriately as a reaction to the overregulation of prior times, should what, in the view of many—they have a valid concern for equity and for the promotion of a fair distribution of R. & D. by Government to smaller firms who happen to be now faced with this new mood of antiregulation, should the concerns of those firms be cast aside for the larger issue of, you know, the total free market, allowing Government—getting Government off everyone's back, cutting down regulations and so forth.

It seems to me that is a bit of an underlying mood, here, and an underlying current. What is surprising is that the small, high-technology firms from Massachusetts with whom I deal, are so often in support of this set-aside and then to have your organization, which represents also many small companies, take the opposite view.

It is very hard to reconcile. Could you explain it for me?

Mr. KNAPP. First, our organization does represent a number of those firms within your district and they are also represented on our board of directors and it is true—our position isn't to get Government off our backs. That is not the approach or the mentality that we have in relationship with our dealings with Government.

Mrs. HECKLER. That is the mentality-blind matter of the antiregulatory move, which I think prevails in the whole business community.

Mr. KNAPP. We agree that for the first time in a long time, that there is a teamwork developing between Government and business and the necessity for that team effort is apparent, that we do have the strongest competitive threat that probably this country has ever faced in the international market.

I sometimes wonder if it is not almost like a war, because it could, in fact, destroy our whole system and our society.

So we take this position and this responsibility very seriously, as I am sure you people do as well. We think, though, that the approach to dealing with this threat has not been totally communicated from people like myself and people like those within our organization.

The fact that we need to come up with a constructive posture that does require certain legislation and certain Government assistance in accomplishing those goals is evidenced.

How we do that we feel has to be done in the most efficient manner possible and we think that incentives for people to do it themselves are always better than incentives to do for those people.

And we certainly are not legislators and we don't have all the answers, but we are here to assist with our opinions and our viewpoint.

So, in fact, we feel there is a teamwork developing between business and you people yourselves, the people who have the legislative control in this country to accomplish that goal, to relieve from us that outside threat.

With regard to your statement about our larger peers saying what we need to do is outlaw Japanese or need to outlaw German products or outlaw some other products.

We know that doesn't work. In a system of free enterprise, the consumer will place the demand and the demand will be met and it is as simple as that.

I think a good example of an attempt to protect American industry in the face of real consumer objection is in the auto industry and we haven't done a good job at that. We in industry haven't done a good job.

So, in fact, I think that protective legislation is not the answer. The answer is developing an atmosphere where we shine above any other country in the world and that is in our competitive spirit as Americans in forming this national attitude about the job we have at hand and that is to raise our economic competition level in this world so it can't be surpassed, it can't be threatened and we have that resourceability.

Mrs. HECKLER. I think we do. I think also there has to be more of a spirit of risk taking and I don't see it. I don't see it at every level of activity. Somehow the entrepreneurs in companies are those who funded the company many, many years ago and a new generation of managers are now given the chief executive officer's title, and I don't see the entrepreneural spirit. I see a different spirit.

I would like to get back to the question of why the small companies in your organization take one position and the Small Business Association in New England, which is very active in New England, take the opposite.

I wonder how many of your smaller companies are actually involved in the decisionmaking process and how universal or how unanimous their position was before you decided to take a stand opposing the legislation.

Mr. **Knapp**. Let me point out our position on set-asides in general was established as a recommendation from the newly formed Small Business Services Committee 2 years ago, and I happened to have been one of the founding fathers of that committee and served on it for 2 years.

I can't really tell you why their associations do not have the same level of consciousness about this problem that we do, but I can tell you why our organization has it and how we arrived at this decision.

By forming a small business committee, we determined that we should take a position in regard to current trends in Government legislation that were affecting small business and one of them we could see through 30 small business—through 30 different types of set-aside programs, a good number of those were oriented directly toward small business.

In fact, in my testimony I listed 80 different programs that we find ourselves protected by. So, based on that information at that time, we felt it wasn't accomplishing the goal we have been communicated to by Congress that they were trying to make the environment better and more fertile for development of our enterprises.

So the Small Business Committee of AEA did make a determination in fact we needed a more fertile climate for business formation and creation, but set-asides weren't the principal method that we felt could cure that problem.

You people, in the face of the current administration opposition, supported and brought out the capital gains tax relief. You also brought out the new stock option programs, R. & D. tax credit. All these things are important elements for small business.

In my business approach alone, the incentive stock option makes it very competitive for me to attract key people when I can't pay the competitive wages he may find in that bigger company, with more responsibilities. So why other associations haven't jumped into this issue I don't know, but I think as an organization, AEA first—as far as I know, there has been no pressure brought to bear on the small business committee to take its position.

It took its position long before this legislation was introduced.

Mrs. **Heckler**. I would say I am glad you are satisfied with the R. & D. sections because I worked with AEAA and the White House on that, and I think it was very, very important. The point I would like to make, however, is this legislation does follow the spirit of partnership to which you referred, but it did not originate from the Government but came from the small business community.

They brought the issue of a lack of fair share of the Federal dollars, the lack of involvement by small business firms in R. & D. to the Congress. It originated with them, and we are responding to that point.

That is one question, the question of equity. Then you have the question of venture capital, and I would agree with Dr. Zschau because we held a hearing in the Science and Research Technology Subcommittee of this committee, in December, at MIT, where we heard a witness from the venture capital field testify exactly as you have, that there is funding for venture capital. So that is not the prime question.

Then you get into the question of the rate of innovation and there the statistics are very impressive. Yesterday the chairman of one of the subcommittees of the Small Business Committee of the Congress testified that small business is accountable for about 24 percent of the rate of innovation in the country.

It gets 4 percent of the R. & D. dollars. So innovation has been the strength of small business, that is exactly how it survived, and was then absorbed by larger companies. If what we are looking for is breakthroughs, shouldn't the innovative rate of the smaller companies make it desirable from a national policy point of view to enlist more of their talents in Federal R. & D.?

Certainly we are talking about a 1-percent set-aside. We are not talking about a 3-percent set-aside that is in the House bill.

Mr. **Zschau**. If I may, I would like to respond to that question.

In my earlier testimony I indicated that it seemed to me, based upon the data, that the small companies, the innovative companies that you describe, are participating about in line with the number of people—that is, scientists and engineers—in those companies. I cite the statistics: About 5.5 percent of the scientists and engineers are in small companies and they get about 6.8 percent of the R. & D. procurement dollars.

We can argue about 6.8 or 4 or whatever, but it seems to be pretty much in line with the resources. Therefore, I am not getting the feeling, at least from that data, that there is not wholesale discrimination against small firms.

But to answer the other question that you asked earlier—why oppose this—I think it may be due to a difference in philosophy. I think every set-aside has resulted from some interest group coming to the Congress asking for special treatment and the Congress, in wanting to respond to that request, grants a set-aside of one kind or another.

As has been testified, there are about 30 such set-asides, so it is not surprising that members of the small business community suggested this rather than the Congress in the first place.

Why are these set-asides continually voted through? Because the Congress wants to respond to the request. And typically, the people who would be the beneficiaries of that request are the ones asking for it.

I feel that this approach has to stop. The only way it can stop is if in this case somebody from the small business community or, better yet, many people in the small business community say:

> Look, you are doing the same thing to R. & D. procurement that you did to the entitlement system.
>
> We have more and more entitlements for special interest groups, and no one in Congress opposes them because they are afraid to offend those groups.

The only way we can stop this practice is for somebody in the small business community to say, "Enough is enough. No more special set-asides. That is not the way to allocate Federal funds." That is why I am here today.

Mrs. **Heckler**. I certainly respect your right, in the face of the experience both witnesses have. It gives us pause to ponder and question deeply the issue before us. I want to say I personally have many misgivings about certain set-asides and especially the manipulation of set-asides which are sometimes facades for others who use this as a conduit rather than genuinely assisting the people the set-aside was designed to assist.

In this case, however, I think there is a split issue rather than the usual set-aside question, which was potentially this question of a special interest, and there is here a national interest.

First of all, you have the innovative rate of small business. Where more than in the field of scientific knowledge do we need a new rate of innovation? What does science and technology breed upon? Innovation.

We have the service to the national interest as well. There is a secondary issue that is many notches below but is still significant to me, which is the job creation issue. Look at the job creation performance of small business across America. We are very concerned with job creation everywhere.

I happen to think that a stimulation in the small business sector is far preferable to money down the drain for veterans employment programs I have been involved with for years that never succeeded, and we know from all of our studies small business generates jobs on the main street of every community in America, so we are serving another need in this particular way.

I think it is unfortunate that the issue is raised at a time when there are so many cross currents in the whole society. I do see that your point on the venture capital is well taken.

Nonetheless, you still have the question of innovation, you have the issue of efficiency in performance in which the small business people have operated at high level. You have the issue of job creation, and I think you have public policy issues that go beyond the common constituency.

Mr. KNAPP. If I could respond, I agree. The fact is we do need to provide a fertile environment for creating new companies that create more jobs. Obviously, more jobs as a percentage of the base employment number are created out of a new company than a very large company.

In fact, under H.R. 5344, where it is suggested that tax incentives be given for the creation of those new companies, that do it through R. & D., and, again, a lot of companies are formed that wouldn't even benefit from the set-asides anyway because they are not in the R. & D. business, but for those companies who do it through R. & D., there are incentives which give them an edge, which gives them an initial kickoff to get them off the ground, but it places a responsibility on them as individuals to make the commitment and develop a program that maximizes its efficiency based on ability so that the tax incentive is only given to them once they have achieved the end result, once they have achieved their objectives.

If I as an individual assign a person to do a task for me, to repair my car, I don't pay them in advance on an irrevocable contract. I wait until they have achieved their objective and satisfied my needs and then I pay them for that effort.

That kind of a program, I think, is more in keeping with the kind of system that has developed strength in the innovation and intramural environment in the country.

Mrs. **Heckler**. Thank you. Mr. McGrath.

Mr. **McGrath**. I have no questions.

Mr. **Fuqua**. I want to thank you, Dr. Zschau and Mr. Knapp, for being here this morning. I think you can tell by the questions that there is a great deal of interest in this legislation and in the impact that it may have on research and the Government. We thank you very much for your contribution this morning.

Mr. **Zschau**. Thank you very much, Mr. Chairman.

Mr. **Knapp**. Thank you, Mr. Chairman.

Mr. **Fuqua**. Our next witnesses will be Ms. Ann Eskesen, director, Small Business Resource Development Center, at Bentley College; Mr. Stanley Mason, president, Simco, Inc.; and Arthur S. Obermayer, vice president, American Association of Small Research Companies.

STATEMENTS OF ANN ESKESEN, DIRECTOR, SMALL BUSINESS RESOURCE DEVELOPMENT CENTER, BENTLEY COLLEGE, AND CHAIR, INNOVATION COMMITTEE, SMALLER BUSINESS ASSOCIATION OF NEW ENGLAND, MEMBER OF SMALL BUSINESS UNITED; STANLEY MASON, PRESIDENT, SIMCO, INC., AND CHAIRMAN, EMERGENCY COMMITTEE TO ENACT THE SMALL BUSINESS INNOVATION RESEARCH ACT OF 1981; AND ARTHUR S. OBERMAYER, VICE PRESIDENT, AMERICAN ASSOCIATION OF SMALL RESEARCH COMPANIES, PRESIDENT, MOLECULON RESEARCH CORP., MEMBER, NATIONAL SCIENCE FOUNDATION ADVISORY COUNCIL

Ms. **Eskesen**. My name is Ann Eskesen, director of the Small Business Resource Development Center at Bentley, but I speak today in the capacity of chairman of the SBANE Innovations Committee, a member of Small Business United. I should underscore that this topic was extensively discussed in a meeting last week in Chicago of Small Business United, which is a coalition of fourteen small business associations from all over the country. The positions taken are those of that organization also.

The title of the bill which is the subject of these hearings has focused a great deal of attention on the contributions and capacities of small business, specifically that segment of the small business community involved in research and development. It has been extensively demonstrated by the very flexiblity and entrepreneurial condition, that these firms are among the most cost effective performers of R. & D. and have historically been a major source of innovation, making contribution thereby to the Nation's economy out of all proportion to their total numbers and individual size.

Concern has been expressed, and appropriately so, that during recent years, these small firms have been seriously impeded in their continuing capacity to deliver to the Nation's needs—often by external factors that could be modified by public sector action.

The demand that prompt attention be given to initiating that action has increased as, by all indicators, the Nation's economic condition is deteriorating and the innovative smaller firm is identified as a crucial ingredient in the task of addressing these problems.

Obviously, as a representative of the small business community, I would concur with those assessments, and will examine how the proposed legislation would address the conditions identified.

First, however, I would like to set these specific issues in a broader analytical context which will enable me to address some of the expressed concerns and arguments raised in opposition to the establishment of SBIR programs in the major Federal agencies.

BASIC RESEARCH

In the debate which has surrounded the proposed legislation, concern has been voiced about the possible adverse effects on the conduct of basic research and it has been argued that implementation of the SBIR program would necessarily result in a cutback on that research.

No responsible member of the small business scientific community would disagree with statement of the critical importance of basic research. The capacity to push out the limits of scientific knowledge is fundamental to the continued health of a techno-industrial economy and represents an investment in the national future that must not be jeopardized. Indeed, it would be argued that as the health of our economy is improved as a consequence of the invigorated innovations process that this legislation would permit, that priority should be given to upgrading the volume of basic research conducted.

To this extent, therefore, there is no argument with those who stress the importance and value of basic research. Neither is there argument with the statement that the academic and nonprofit research communities have been, and must continue to be, major contributors to that research endeavor.

That with which the small business community would take issue in the current debate, is that conduct of research, and specifically basic research, should be considered the exclusive prerogative of any one segment of the scientific community. The term "community" here is carefully chosen and requires some explanation.

THE CHANGING STRUCTURE OF THE SCIENTIFIC COMMUNITY

In an editorial in *Science*, October 16, 1981, Dr. Frank Press, president, National Academy of Science, referenced the obligation of the scientific community "to point up the consequences of specific cuts (in Federal R. & D. funding) and to insure that the remaining Federal resources are allocated wisely and to maximum effect."

He went on to suggest a reexamination of "the national research enterprise—including academic research, national laboratories, and industrial research—to learn whether new institutional relationships and other structural changes can preserve our scientific strengths in a period of financial stringency."

And argued that "all sectors of the scientific community must be prepared to set aside the shibboleths of the past and perhaps propose new modes of research just as effective yet less costly."

The structural changes Dr. Press identifies are not new but rather are characteristic of the dynamic condition of science for over half a century as it reflects the conditions and concerns of the day.

The period between the two World Wars saw a continuing traffic of scientists moving in both directions between Western Europe and the United States. Beginning in the thirties, the concentration of scientific excellence shifted from locations in Europe to the increasingly well-endowed American institutions of higher learning. Individuals within the American business and industrial sectors provided much of the resource which made this happen, and absorbed many of the products of the institutions thus established. The close ties of the period were reflected in the emphasis given in graduate training to meeting the needs of industry.

The rapid and expansive growth experienced in academic institutions during the fifties and sixties can be characterized as a shifting away from dependency and responsiveness to the industrial and business communities. This shift was reflected in a growing emphasis on development of research skills in Ph. D's who would be absorbed by the expanding institutions which trained them.

In effect, as more than one wit has observed, during this period professors were primarily involved in perpetuating the species—an activity entirely appropriate to meet the needs of a rapidly expanding educational system, but an activity with serious consequences when the universe in question stabilized during the seventies, and gives every indication of contracting in the eighties.

It was observed in a report prepared for this committee last summer, "Survey of Science and Technology Issues Present and Future," Staff report of the Committee on Science and Technology. U.S. House of Representatives, 97th Congress. June 1981, that:

> Unfortunately universities, and hence university research, appear to be entering a period of increasing problems associated with a complex of factors. Such factors include:
>
> Constraints on scientific manpower, including decreases in student enrollments, and the aging of the exisiting scientific manpower at universities, *with a concomitant decline in the number of research opportunities for younger scientists.* [Emphasis added.] (P. 425.)

The seriousness of these deteriorating conditions must be of concern to us and demand attention. But they also have implications that are directly relevant to the issue under consideration today.

Many of research competence, particularly among the young, trained well by our major universities, can no longer be ensured employment there. Where are these important resources now employed?

The spector of Ph. D's driving taxicabs does not define the reality. Almost all these highly trained professionals have been absorbed into other nonacademic establishments which have need of their skills. There has occurred, in short, a diversification in the affiliation of those of research competence that must be recognized and factored into any decision on how to encourage and develop our scientific strength and task potential.

An interesting comment on the condition of American science is that, if Nobel prizes are any indicator, our science base is strong. If there is weakness, it is more in the effective management of our resource ensuring that the best use is made of each and all segments of the research community.

An important part of that community should be recognized as the small business research firm. In testimony to the Senate Small

Business Committee, a NASA official stated that in the area of basic research "we find small business contributions of particular significance."

The small business firm is not likely to make any significant claim to the conduct of basic research, but they do demand the recognition that if the competency can be demonstrated, they should have right of response to solicitation, a right hardly reflected in the current levels of 3.8 percent of Federal R. & D. funding.

If I might make reference back to the testimony we just received, it should be noted that the SPDC data which was used as a basis of argument for the 6.8 percent is a record only of contracts and not of grants, which is the capacity in which most R. & D. money is put out.

RESEARCH COMPETENCE

The question of competence and of quality in research has been made an issue in this debate with the suggestion that development of an SBIR program as defined, would necessarily require, and result in, a lowering of standards. Ignoring the implicit insult to the many of demonstrated competence in the broader research community, small business would like to go on record as requiring that implementation of the program be with the highest standards of scientific and technical excellence made a condition of funding.

I have been extensively quoted by proponents of this bill as arguing that the NSF-SBI program has represented no lowering of standards and indeed proposals funded have been of comparable and on occasion of better quality than those received by NSF from more traditional sources. I would stand by that assertion and would find support from Dr. Atkinson, Director of the National Science Foundation, when he responded in 1979 to a question from this committee by saying:

> It has worked out well. We were concerned that the small business proposals might not compete favorably with others received by NSF. But we have worked with the various small business groups to communicate our concern and we are very satisfied with the proposals we are receiving. There is no question about the excellence of the proposals that are flowing into the small business innovation program. (Ibid p. 83).

Mediocrity has no place in the conduct of science and we would insist that the same standards of excellence required of SBIR awards be those applied to all federally funded research, basic or applied. It is our consistent position that competence, not institutional affiliation should be the fundamental evaluative criteria. To the extent that the small business research community, or any other, can demonstrate the competency demand, it is in our national interest that funding to support that research be made available.

ACADEMIC-BUSINESS COOPERATION

It is distressing that the most vocal opposition to SBIR has come from a small number within the university and nonprofit research communities at a time when the mutually beneficial consequences of cooperation between specific institutions and the private sector is so much in evidence. Readily come to mind the longstanding cooperation of MIT with firms in the 128, now 495, complex; the more recent efforts at RPI in upstate New York and at Carnegie-Mellon in Pittsburgh, of the coalition venture in Philadelphia and the programs at Ohio State, Utah, Georgia Tech, and the University of Kansas, among many.

The critical importance of industrial cooperation with the University of Illinois in the development of the synthetic fiber and plastics industry; work at MIT, in Palo Alto and Berkeley on semiconductors and digital machinery, and perhaps the most current efforts in the field of biomedical research are all examples of the same condition in which basic research conducted in the university setting provides underpinning to an industrial application made by the private sector.

It is surely no accident that many of the firms, both large and small, on the leading edge of advanced technology are those maintaining close and cooperative ties to the university community. As a case in point, though the NSF-SBI program does not require an academic association, it is reported that a significant percentage in fact have resulted in a cooperative effort of some kind (table I and IA).

There is important contribution to be made by both the academic and private sector to the process of innovation. It is disappointing therefore that when the challenge is so great and so much to the national benefit could accrue from an integrated research and development establishment, that our energies are being diverted into what seems close to internal factionalism.

SET-ASIDES AND LEVELS OF FUNDING

Concern has been expressed with the mechanism of set-aside in the implementation of this legislation. I suppose I have some problem with the idea that SBIR should be considered a set-aside as the term is used and has been applied in the past.

In practice, a set-aside involves taking a work description and activity that can reasonably be assumed within the competence and capacity of any number of different organizations and, for an entirely different set of reasons, make the decision to allow one particular subseqment of those organizations, and only them, to do the work.

In a fundamental sense, this condition does not apply to the SBIR program, namely, that capacity successfully to engage in the innovation process—taking an initial concept from idea to market penetration—is demonstrably not within the competence and capacity of any number of different organizations. The academic institution is not, and should not, be geared to seek commercial application. That is simply not their function. They are not, therefore, innovators as the term is being applied in the context of SBIR. To the extent that larger corporations have the capacity to innovate, as I will discuss in a moment, they have both the internal resources available to support the high-risk, early-stage activity and the external access that might be necessary to underwrite the capital needs of the venture.

SBIR is a remarkably creative mechanism that uses Federal resources on a limited basis to seed a venture and sustain it to the point where it becomes viable in the general business context. This hybrid/cooperative activity is unique to the extent that continued funding (second stage) is conditional upon evidence of the interest and availability of private sector resources to finish the job. Any second stage proposal unable to show that interest is effectively eliminated from further consideration.

The funding percentages suggested in the legislation are less critical in their specifics than as requirement that the program be funded and appropriately administered at levels that gives some reasonable likelihood of success. The 1 to 3 percent levels under consideration would not significantly increase the overall percentage of small business involvement in Federal R. & D. What it would do, and has already done, is stimulate the small business community to do what they do best, to innovate, leveraging Federal monies at levels that represent a respectable return on investment (table I and IA).

[The tables I and IA follow:]

TABLE I

FY 1972 SMALL BUSINESS SOLICITATION

INFORMATION ON PHASE II AWARDEES

Topic 1 - Hydrometallurgy	State	Phase II Amount	Employment In Propos.	Employment Now	University Coupling	VC Outlook
1. Bend Research	OR	$183,800	10	26	No	Interest, no commitment
2. Moleculon Research	MA	333,392	14	20	MIT	Letter of interest
Topic 2 - Food Crops and Environmental Stress						
3. Soil & Land Use Tech	MD	236,265	2	34	U. Mo.	$130K contract in process Two add'l possibilities
Topic 3 - Chemical Threats						
4. SISA, Inc.	MA	188,840	19	35	MIT	Depends on research results
5. Western Chem. Res. Corp.	CO	56,372	0	6	Col. State	No com. now, maybe later
6. Moleculon Res. Corp.	MA	239,241	14	20	MIT	$220K com. from Norton Co. w/$35K invested; plus $10K from Dow Chemical
Topic 4 - Production Processes						
7. Scientific Proc. & Res.	NJ	200,000	8	12	No	$200K commitment
8. OHEX	CA	147,750	45	98	U. IA, TX, AZ	Rec'd $3M venture capital
9. Terraspace, Inc.	MD	136,852	3	2	U. MD	Letter of interest
10. Ceramic Finishing Co.	PA	143,134	4	8	Penn State, URI	Good: Ford, GM
Topic 5 - Physically Handicapped						
11. Scientific Systems	MA	94,886	6	32	Tentative MIT	Liberty Mutual interested
12. Integrated Sciences	CA	118,301	16	14	UCLA, UCSB, CUNY	Too early
Topic 6 - Technology Assessments						
(none)						

TABLE IA

Topic 7 - Applied Science - Open	State	Amount	Employment At Award	 Now	University Coupling	VC Outlook
13. Collaborative Research	MA	$239,378	33	70	Harvard	Rec'd $5M from lg industrial Drug co funding also possible
14. Agbabian Associates	CA	922,042	57	57	UC Berk, UCSD	Service
15. S.B. Barnes	CA		17	16	"	
16. Kariotis, Kesler & Allys	CA		9	12	"	
17. George D. Ward & Assoc.	OR	183,445	3	5	Miss St., OR St.	Rec'd $3K, more possible
18. Terra Tek	UT	219,822	85	203	U of Mich, Utah, Brown, MIT	New product on market
19. Advanced Mech. Tech.	MA	186,408	6	28	MIT	Excellent depending on NRC
20. Terra Tek	UT	151,272	05	203	Caltech,Minn, Utah, UC Berk,MIT, TX A&M	Com'l potential
21. Ionomet Co.	MA	240,320	1	8	MIT	$240K commitment
Total	8	$4,270,020	437	876		

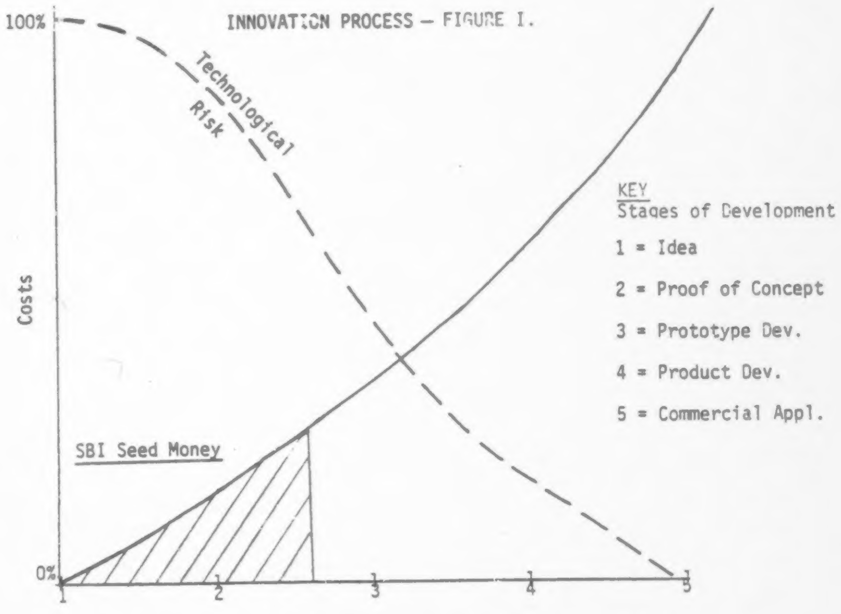
Ms. **Eskesen**. A further advantage might well prove to be the drawing into the general procurement many of competence who have had every disincentive formerly to be there, an issue I believe Dr. Obermayer will be discussing.

IMPEDIMENTS TO THE INNOVATION PROCESS

The major contribution of the small research firm is to the process of innovation, the taking of an initial concept through all the stages of research, development, and demonstration into commercial application. This completed cycle has been demonstrated as having the effects of creating jobs, improving productivity, broadening the tax base and providing greater capacity to compete successfully in the international arena.

With the primary emphasis on the accrued benefits of the innovations process completed, it is often overlooked that much of our current innovation malaise correlates with the nonavailability of early stage, high-risk money with which to begin the process and take it to the point where it can be of interest of the institutionalized financial resources.

[Figure I follows:]



Source: Adapted from BIRDF Annual Report 1978-9 (not to scale)

Ms. **Eskesen**. Figure I describes the innovation process in which, when technological risk is high, relative funding requirements are probably low. As progress is made, the relative risk/cost relationship invert with a reduced technological risk at the stage of market penetration being matched by a substantially increased capital requirement.

In the mature, larger firm, these early-stage funds can be met readily from the cash flow generated from existing product lines, and the expenses thus incurred can be offset against that income for tax purposes. By contrast, the limited internal resources of the smaller firm usually necessitate reliance upon external sources. It is estimated that a small firm must raise more than twice the capital from outside sources to support the same level of R. & D. effort of the larger corporation. An already difficult situation of outside dependence is compounded in the current conditions of high interest rates and tight credit. The money is simply not there to be had.

Suggestions have been made that the expanded resources of the venture capital community should be considered an appropriate source. But the facts are that the high-risk condition, and the relative small scale of funds needed essentially preclude that source as one of significance in early stage projects.

It simply is a misstatement to suggest that those funds are made available to the early stages of a product. In testimony to a subcommittee of this committee recently at MIT, the chairman of A. R. & D., the largest venture capital organization in the country, specifically stated that he does not, and the venture community does not, generally become involved in early-stage projects.

It should also be noted that as a percentage of those proposals received, the venture capital community funds less than 1 percent. Of that 1 percent perhaps somewhere the figure of 14 percent of startups funded comes. Can we afford to leave an activity as important as this one to the possibility of a 14th percent of 1 percent likelihood of receiving funding from external sources?

The proof-of-concept funding problem is precisely that so effectively addressed by the SBIR program which has now achieved a sufficient track record to show that small-scale injection of funds at the appropriate development stages assist toward:

1. Bringing a wide range of new products and processes closer to market condition; and
2. Attacting a significant volume of private sector money into participant firms.

The program works. It works in its defined objectives and it works in the most important sense of providing the structure to give support to our strengths and make investment in our future.

There are two additional comments I would like to have entered into the record. They both refer to issues raised in earlier testimony of paperwork and bureaucracy. Specifically, the SBIR program is a very simplified paperwork endeavor.

Bureaucracy simply does not enter into the process of administration. The current solicitation for the National Science Foundation received 1,800 proposals handled by a very effective two-person office.

Similarly, the 1,103 proposals received under DOD are handled by just 2 people. To set up a facade of excessive paperwork and bureaucracy, I think, is to draw a red herring across the issue primarily under discussion.

Thank you, sir.

[The prepared statement of Ann Eskesen follows:]

Bentley College
Small Business Resource
Development Center

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

H.R. 4326 SMALL BUSINESS INNOVATION DEVELOPMENT ACT OF 1981

January 28, 1982

Prepared Remarks of:
ANN ESKESEN, Director
Small Business Resource
Development Center
and
Chair: Innovations Committee
Smaller Business Association
of New England (SBANE)

Waltham, Massachusetts 02254 (617) 891-3433

Mr. Chairman, Members of the Committee

My name is ANN ESKESEN, Director of the Small Business Resource Development Center at Bentley College, Waltham, MA. I present testimony today in the capacity of Chair of the Innovations Committee of the Smaller Business Association of New England (SBANE), one of the oldest and most highly respected of small business organizations in the country, and a member of Small Business United (SBU), a national coalition of small business associations. I would like to thank the Committee for the opportunity to speak in support of H.R. 4326 proposing creation in designated federal agencies of Small Business Innovation Research programs modeled upon those so effectively functioning within the National Science Foundation and more recently, the Department of Defense.

The title of the bill which is the subject of these hearings, has inevitably focussed attention on the contributions and capacities of small business, or more specifically, that segment of the small business community engaged primarily in research and development. It has been extensively demonstrated that these firms, by their very flexibility and entrepreneurial condition, are among the most cost-effective performers of R & D and historically have been a major cource of innovation, making contribution thereby to the nation's economy out of all proportion to their total numbers and individual size.

Concern has been expressed, and appropriately so, that during recent years, these small firms have been seriously impeded in their continuing capacity to deliver to the nation's needs – often by external factors that could be modified by public sector action. The demand that prompt attention be given to initiating that action has increased as, by all indicators, the nation's economic condition is deteriorating and the innovative smaller firm is identified as a crucial ingredient in the task of addressing these problems.

Obviously, as a representative of the small business community, I would concur with those assessments, and will examine how the proposed legislation would address the conditions identified. First, however, I would like to set these specific issues in a broader analytical context which will enable me to address some of the expressed concerns and arguments raised in opposition to the establishment of SBIR programs in the major federal agencies.

Basic research

In the debate which has surrounded the proposed legislation, concern has been voiced about the possible adverse effects on the conduct of basic research and it has been argued that implementation of the SBIR program would necessarily result in a cut-back on that research.

No responsible member of the small business scientific community would disagree with statement of the critical importance of basic research. The capacity to push out the limits of scientific knowledge is fundamental to the continued health of a techno-industrial economy and represents an investment in the national future that must not be jeopardized. Indeed, it would be argued that as the health of our economy is improved as a consequence of the invigorated innovations process that this legislation would permit, that priority should be given to upgrading the volume of basic research conducted.

To this extent, therefore, there is no argument with those who stress the importance and value of basic research. Neither is there argument with the statement that the academic and non-profit research communities have been, and must continue to be, major contributors to that research endeavor.

That with which the small business community would take issue in the current debate, is that conduct of research, and specifically basic research should be considered the exclusive prerogative of any one segment of the scientific community. The term "community" here is carefully chosen and requires some explanation.

The changing structure of the scientific community

In an editorial in Science, October 16, 1981, Dr. Frank Press, President, National Academy of Science referenced the obligation of the scientific community "to point up the consequences of specific cuts (in federal R & D funding) and to ensure that the remaining federal resources are allocated wisely and to maximum effect." He went on to suggest a reexamination of "the national research enterprise — including academic research, national laboratories, and industrial research — to learn whether new institutional relationships and other structural changes can preserve our scientific strengths in a period of financial stringency." and argued that "All sectors of the scientific community must be prepared to set aside the shibboleths of the past and perhaps propose new modes of research just as effective yet less costly."

The structural changes Dr. Press identifies are not new but rather are characteristic of the dynamic condition of science for over half a century as it reflects the conditions and concerns of the day.

The period between the two World Wars saw a continuing traffic of scientists moving in both directions between Western Europe and the United States. Beginning in the thirties, the concentration of scientific excellence shifted from locations in Europe to the increasingly well endowed, American institutions of higher learning. Individuals within the American business and industrial sectors provided much of the resource which made this happen, and absorbed many of the products of the institutions thus established. The close ties of the period were reflected in the emphasis given in graduate training to meeting the needs of industry.

The rapid and expansive growth experienced in academic institutions during the fifties and sixties can be characterized as a shifting away from dependency and responsiveness to the industrial and business communities. This shift was reflected in a growing emphasis on development of research skills in Ph.Ds. who would be absorbed by the expanding institutions which trained them. In effect, as more than one wit has observed, during this period professors were primarily involved in perpetuating the species — an activity entirely appropriate to meet the needs of a rapidly expanding educational system, but an activity with serious consequences when the universe in question stabilized during the seventies, and gives every indication of contraction in the eighties.

It was observed in a report prepared for this committee last summer[1] that

> "Unfortunately universities, and hence university research, appear to be entering a period of increasing problems associated with a complex of factors. Such factors include:
>
> > Constraints on scientific manpower, including decreases in student enrollments, and the aging of the existing scientific manpower at universities, with a concomitant decline in the number of research opportunities for younger scientists." (emphasis added) p.425

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[1] Survey of Science and Technology Issues Present and Future, Staff report of the Committee on Science and Technology. U.S. House of Representatives Ninty-Seventh Congress. June 1981.

The seriousness of these deteriorating conditions must be of concern to us and demand attention. But, they also have implications that are directly relevant to the issue under consideration today.

Many of research competence, particularly among the young, trained well by our major universities can no longer be ensured employment there. Where are these important resource now employed?

The spector of Ph.Ds. driving taxi-cabs does not define the reality. Almost all these highly trained professionals have been absorbed into other non-academic establishments which have need of their skills. There has occurred, in short, a diversification in the affiliation of those of research competence that must be recognized and factored into any decision on how to encourage and develop our scientific strength and task potential. An interesting comment on the condition of American science is that, if Nobel prizes are any indicator, our science base is strong. If there is weakness, it is more in the effective management of our resources ensuring that the best use is made of each and all segments of the research community.

An important part of that community should be recognized as the small business research firm. In testimony to the Senate Small Business Committee, a NASA official stated that in the area of basic research "we find small business contributions and potential particularly relevant". The small business firm is not likely to make any significant claim to the conduct of basic research, but they do demand the recognition that if the competency can be demonstrated, they should have right of response to solicitation, a right hardly reflected in the current levels of 3.8% of federal R & D funding.

Research competence

The question of competence and of quality in research has been made an issue in this debate with the suggestion that development of an SBIR program as defined, would necessarily require, and result in, a lowering of standards. Ignoring the implicit insult to the many of demonstrated competence in the broader research community, small business would like to go on record as requiring that implementation of the program be with the highest standards of scientific and technical excellence made a condition of funding.

I have been extensively quoted by proponents of this bill as arguing that the NSF-SBI program has represented no lowering of standards and indeed proposals funded have been of comparable, and on occasion of better quality than those received by NSF from more traditional sources. I would stand by that assertion and would find support from Dr. Atkinson, Director of the National Science Foundation when he responded in 1979 to a question from this committee by saying:

> "It has worked out well. We were concerned that the small business proposals might not compete favorably with others received by NSF. But we have worked with the various small business groups to communicate our concern and we are very satisfied with the proposals we are receiving. There is no question about the excellence of the proposals that are flowing into the small business innovation program."[2]

Mediocrity has no place in the conduct of science and we would insist that the same standards of excellence required of SBIR awards be those applied to all federally funded research, basic or applied. It is our consistent position that competence, not institutional affiliation should be the fundamental evaluative criteria. To the extent that the small business research community, or any other, can demonstrate the competency demanded, it is in our national interest that funding to support that research be made available.

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[2] Ibid p.83

Academic—business co-operation

It is distressing that the most vocal opposition to SBIR has come from a small number within the university and non-profit research communities at a time when the mutually beneficial consequences of co-operation between specific institutions and the private sector is so much in evidence. Readily come to mind the long standing co-operation of MIT with firm's in the 128, now 495, complex; the more recent efforts at RPI in upstate New York and at Carnegie-Mellon in Pittsburgh, of the coalition venture in Philadelphia and the programs at Ohio State, Utah, Georgia Tech and the University of Kansas, among many.

The critical importance of industrial co-operation with the University of Illinois in the development of the synthetic fiber and plastics industry; work at MIT, in Palo Alto and Berkley on semi-conductors and digital machinery, and perhaps the most current efforts in the field of biomedical research are all examples of the same condition in which basic research conducted in the university setting provides underpinning to an industrial application made by the private sector.

It is surely no accident that many of the firms, both large and small, on the leading edge of advanced technology are those maintaining close and co-operative ties to the university community. As a case in point, though the NSF-SBI program does not require an academic association, it is reported that a significant percentage in fact have resulted in a co-operative effort of some kind. (Table I & IA)

There is important contribution to be made by both the academic and private sector to the process of innovation. It is disappointing therefore that when the challenge is so great and so much to the national benefit could accrue from an integrated research and development establishment, that our energies are being diverted into what seems close to internal factionalism.

Setasides and levels of funding

Concern has been expressed with the mechanism of setaside in the implementation of this legislation. I suppose I have some problem with the idea that SBIR should be considered a setaside as the term is used and has been applied in the past.

In practise, a setaside involves taking a work description and activity that can reasonably be assumed within the competence and capacity of any number of different organizations and, for an entirely different set of reasons, make the decision to allow one particular subsegment of those organizations, and only them, to do the work.

In a fundamental sense, this condition does not apply to the SBIR program, namely that capacity successfully to engage in the innovation process — taking an initial concept from idea to market penetration — is demonstrably not "within the competence and capacity of any number of different organizations". The academic institution is not, and should not, be geared to seek commercial application. That is simply not their function. They are not, therefore, "innovators" as the term is being applied in the context of SBIR. To the extent that larger corporations have the capacity to innovate, (and they have shown less of an inclination to do so) as I will discuss in a moment, they have both the internal resources available to support the high risk early-stage activity and the external access that might be necessary to underwrite the capital needs of the venture.

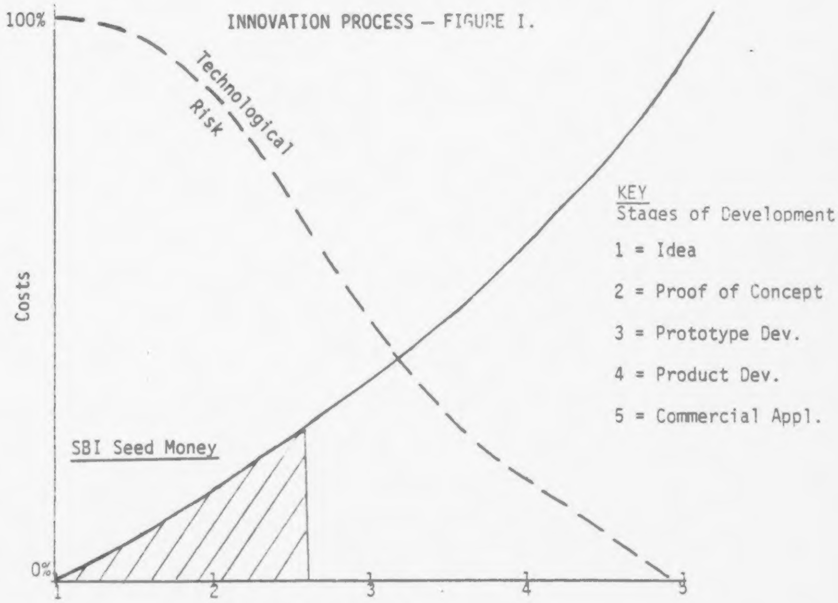
SBIR is a remarkably creative mechanism that uses federal resources on a limited basis to "seed" a venture and sustain it to the point where it becomes viable in the general business context. This hybrid/co-operative activity is unique to the extent that continued funding (second stage) is conditional upon evidence of the interest and availability of private sector resources to finish the job. Any second stage proposal unable to show that interest is effectively eliminated from further consideration.

The funding percentages suggested in the legislation are less critical in their specifics than as requirement that the program be funded and appropriately administered at levels that gives some reasonable likelihood of success. The 1% – 3% levels under consideration would not significantly increase the overall percentage of small business involvement in federal R & D. What it would do, and has already done, is stimulate the small business community to do what they do best, to innovate, leveraging federal monies at levels that represent a respectable return on investment. (Table I & IA). A further advantage might well prove to be the drawing into the general procurement many of competence who have had every disincentive formerly to be there, an issue I believe Dr. Obermayer will be discussing.

Impediments to the innovation process

The major contribution of the small research firm is to the process of innovation, the taking of an initial concept through all the stages of research, development, and demonstration into commercial application. This completed cycle has been demonstrated as having the effects of creating jobs, improving productivity, broadening the tax base and providing greater capacity to compete successfully in the international arena.

With the primary emphasis on the accrued benefits of the innovations process completed, it is often overlooked that much of our current innovation malaise correlates with the non-availability of early-stage, high risk money with which to begin the process and take it to the point where it can be of interest of the institutionalized financial sources.


INNOVATION PROCESS — FIGURE I.

Source: Adapted from BIRDF Annual Report 1978-9 (not to scale)

Figure I describes the innovation process in which, when technological risk is high, relative funding requirements are probably low. As progress is made, the relative risk/cost relationship invert with a reduced technological risk at the stage of market penetration being matched by a substantially increased capital requirement.

In the mature, larger firm, these early-stage funds can be met readily from the cash flow generated from existing product lines, and the expenses thus incurred can be offset against that income for tax purposes.

By contrast, the limited internal resources of the smaller firm usually necessitate reliance upon external sources. It is estimated that a small firm must raise more than twice the capital from outside sources to support the same level of R & D effort of the larger corporation. An already difficult situation of outside dependence is compounded in the current conditions of high interest rates and tight credit. The money is simply not there to be had.

Suggestions have been made that the expanded resources of the venture capital community should be considered an appropriate source. But the facts are that the high risk condition, and the relative small scale of funds needed essentially preclude that source as one of significance in early stage projects.

The proof-of-concept funding problem is precisely that so effectively addressed by the SBIR program which has now achieved a sufficient track record to show that small scale injection of funds at the appropriate development stages assist towards:

1) bringing a wide range of new products and processes closer to market condition

2) attracting a significant volume of private sector money into participant firms.

The program works. It works in its defined objectives and it works in the most important sense of providing the structure to give support to our strengths and make investment in our future.

Mr. **Fuqua**. Thank you very much.

Dr. Mason.

Mr. **Mason**. Thank you very much. My testimony will take about 10 minutes. My name is Stanley Mason. I am president and founder of three small corporations: Simco of Connecticut in Weston, Conn.; the Masonware Corp. of Newport Beach, Calif.; and Simco of Texas in Houston. I am also the chairman of the Emergency Committee to Enact the Small Business Innovation Research Act of 1981.

In a capsule, it is our experience that the value of Federal funding of research in small high-technology companies is in no way competitive to the funding of basic research in universities or in large corporations. In fact, such funding reinforces the symbiotic interrelationship of mutual dependence and support among the three.

Certainly, a Federal allocation of 3 percent is small when you are talking about the big dollars going to basic research in universities and to support research in large businesses when you consider the relative efficiencies of the investment. We must look into what 3 percent can contribute in relationship to social and economic gains for the country.

It is a multiplier, not a simple addition. There is no need to reiterate the statistics of previous testimony other than to remind ourselves that the majority of all patents come from individuals and small organizations and not universities and big business. Likewise, 80 percent of all new jobs are generated within small business and not by universities and large businesses.

Essentially, it is the risk-taking attitude and creative ability of the entrepreneurial spirit of small firms which is truly the economic driver for their personal as well as corporate income and growth: and subsequently, the payment of taxes which in turn support the universities and basic research. This economic driver does not exist within the incentive psyche of university staffs and researchers, and also does not exist within the mind of the corporate researcher.

Further, it has been our experience, in working with both universities and large companies, that although each of these essential institutions are populated by brilliant and effective people with great capacity for accomplishment of tasks, they have problems in bringing their work to function as far as the people are concerned.

One of the major skills we see being developed by the small high-technology community is that of coupling the basic research generated within the university to the large corporations' strengths, to produce major economic and social benefits.

These principles have functioned well in my small companies.

Simco of Connecticut is a think-tank group which has a laboratory and invents new products and processes. Half of our time, we work on wholly-owned proprietary products. The other half of the time we work on client programs for about 18 Fortune 500 companies.

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The oil from the Chinese tallow then can be put in a diesel engine such as a Mercedes or a Rabbit and the engine runs happily with the same efficiency as though it were on regular diesel fuel.

I brought some of the seeds along. In a moment I will demonstrate their energy.

It is really my pleasure to speak to the committee today about research and development in general, and about the potential of small business innovation in relation to universities and large companies. I bring you the view of a person who has lived his career in both small and large companies. These companies ranged from 3 to 80,000 employees.

I started my work at the United States Steel Corp. as a draftsman while in college. I developed my first invention there at age 21. It was the first level-winding constant speed wire drawing machine. They are still in use. After a stint as a pilot in World War II, I went to the Armstrong Cork Co. as an industrial communications trainee, then to the Martin Aircraft Co. as a tool engineer. I quit Martin to set up a small plastic adhesives company, which I sold after 3 years. I rejoined Martin, where I became responsible for the technical proposals for the Titan, the Vanguard Earth Satellite, and others.

I left to become responsible for all packaging and new products at Hunt Wesson Foods, part of the Norton Simon empire. Then, and until 1973, for 6 years I was vice president for product development and technical services at the American Can Co. I was responsile for nine laboratories and an operation of about 500 scientists and technologists of all sorts.

In 1973 I organized Simco in Connecticut. Since that time we have been doing all kinds of work in high and low technology for companies such as Johnson & Johnson, Johnson's Wax, Frito-Lay, American Can, Lipton Tea, Tupperware, Nestle AAC's, and a large group of others.

We actually develop products and solve special technical problems for these companies. We support the internal scientific and marketing organizations; we do not compete with them.

However, we are not ordinary consultants. We actually create and develop new products. We are not just a recommending group. These companies hire us not only for our innovative ideas, but also because we can often complete the work faster and cheaper than they could do the job internally. We bring a view of the outside world uncontaminated by internal politics or scientific prejudices.

In general, as a small broad-based group, we can exert more focused technical direction and financial control than they can. We can focus our thinking and put talent with greater special technical competency on the job than they can. We can do this for two reasons: First of all, we operate on a unique network principle in which we bring to bear our own scientific talents and those of a broad spectrum of associates within universities across the country with whom we have been working over the years.

One might ask why our large company clients don't just hire the university people directly or why don't the universities pursue their product development relationships themselves. The reason they don't seems to lie in the fact that the active entrepreneurial spirit is not often found in either the university or within large organizations. There is a difference in the kind of people in large companies, university labs, and small companies.

If a young technical man is good in a large company, and really good, and he is just out of college, he is assigned to work on the bench. His assignments stay within his technical skills for 1 or 2 years. Then he is promoted. He directs the work of others.

If he is really good, up the ladder of management he goes, and he is not dealing with the technical work any more—the innovations or the inventions. He is signing vacation vouchers, decorating the office, and visiting customers. Except in organizations such as Bell Labs and others, the technical work really is left to the lowest level of people, the newcomer, the inexperienced person.

However, small companies are made up of some of the best of the scientists and technicians. They apply their technical expertise as it grows to the technical problems and opportunities of invention and innovation.

Here I am, 60 years old and I have received more patents in the last 10 years since I have been in my own small business than I wrote for the 30 years previously. I was the same man all though my career, but just decided to do it for myself; the incentives for personal satisfaction and for financial reward cannot be compared.

I must admit I was probably a maverick in these large companies. You have to understand that, perhaps more importantly, innovative people are literally driven out of large companies due to subtle and sometimes overt pressures. I know to make it in a large company you really must conform. If you do not you are not promoted. You might even get fired.

To make it in a large company it helps to be tall and handsome and articulate. It helps to be conservative and not innovative. You must not take chances with the company's money.

On the other hand, a man in the small company makes it on talent and not looks. He can share the results of his innovative nature in royalties and in shared ownership.

However, I am not attacking large companies or universities. Far from it. They are the heart of the country's strength. They have produced the wealth and the power that we are in America. They are also my customers and the source of problem-solving talent.

However, this is the crux of my testimony: If small companies produce the most innovative ideas and products and jobs for the Nation, why not help them? Give them the incentive of the 3 percent. This legislation is truly important to the future health of the country, both long- and short-term.

The equation is very simple. If a dollar put toward supporting R. & D. for a large company or university produces x return for the country, that same dollar supporting R. & D. in small companies will produce x times 50 or 100. It is a good proposition and with very low risk. It can be evaluated by dollars, or by public good in social and economic values.

It seems to me it is just a matter of priority. It is not that we want to give less emphasis to university or large corporate R. & D. It is simply we want to recognize the potentiality of the small company R. & D. We want to be sure the money is used in the most productive way.

Now I want to tell you about this tallow project because it is an example of the support to small high-technology companies: that which the NSF people have been giving, the model for this legislation.

The work that Simco has been accomplishing in the Chinese tallow tree project is of considerable complexity. It involves a network that is national in scope, with simultaneous effort taking place in universities, cooperative Government labs, the Texas State government agencies, and the development departments of more than 10 corporations.

Under the direction of Dr. W. H. Scheld, Simco's director of research and principal scientist in Houston, Simco had been supporting the study of the oil aspects of the Chinese tallow for more than 5 years.

I was supporting the work because I was interested in it, and saw great potential in it, not for myself necessarily, but for the Nation. It was one of those things which just had to be done.

The tallow tree is an interesting and potentially important substitute for petroleum because it is capable of producing 10,000 pounds of seed per acre from poor, marginal, wet, salty soil where hardly anything else will grow. It produces much, much more vegetable oil per acre on this poor soil than conventional oilseed plants, soybean, et cetera, does on good soil.

Tallow oil needs no refining as petroleum does. Farmers can make at least three to four times as much on Chinese tallow from marginal soil than they can from corn or cotton on good land. It is not a new crop. It has been grown in China for centuries and has been an export commodity for a long time. Lastly, it has no important insect or other enemies.

In spite of all these advantages and all of our work initially, we had a very difficult time getting any corporate interest in this crop mainly because corporate investment usually must be returned by the project in 2 years.

And this tree grows slowly, like any other plant. Mother Nature limits their growing speed with which return on investment is made.

We spoke to some of our financial friends. We tried very, very hard to talk to all kinds of fundraising organizations and they all thought it was a very interesting project and they said, "Come back when you have some real facts." In other words, they cannot fund an idea. They want prototypes. It is like you can't borrow money from a bank unless you don't need it.

Then the people at the National Science Foundation heard about us. We actually did not seek them. They heard about the possibilities of the Chinese tallow and our work; from technical publications we had written. NSF people are really the innovative people.

We were able to create a technical proposal, and with minimum of redtape and complexity, it was funded by NSF at the $25,000 level. This is truly modest, but it represented recognition to us and to potential investors.

Incidentally, when we make proposals to corporate organizations to do development work or research work, believe me, sometimes the complexity in dealing with the large corporate organization far exceeds the NSF contact. It really does.

With this NSF funding, we organized a detailed, carefully thought-out program of development; genetics, selection, cloning, development of harvesters, and marketing considerations, including the use of the oil in a wide range of applications far beyond the use of the oil as an alternative fuel for diesel engines. It can be used for food. It can be used for drugs, for synthetic lubricants, for plastics, as well as for diesel oil.

We invested more than the grant sum in background work in preparation of the proposal so it would be complete and would represent good science and be a real blueprint of a viable program.

The point is, without the NSF incentive, the fine reputation of NSF, and the careful handsoff yet experienced science policy guidance from the small business people at NSF, Simco would have never organized a program with such drive and care and precision on its own. Perhaps the Nation would never have had the opportunity for such a rich source of renewable energy as this tallow tree offers.

We really do need to press forward and allocate the 3-percent funding to small business research. It will return this sum, with large interest, year after year.

Now I am going to burn one of these seeds for you. The one I have is just an ordinary random seed and I am holding it with a paper chip. It may have moistened, which may cause it to perhaps explode, but I will try to ignite it. Outside is a white tallow which is edible.

Do you see the jet of flame coming out of that? Can you see it? It is just like a little blowtorch. You can imagine what an acre of those would do.

I would like to invite the committee to come up to Connecticut to our offices to see how a small business like ours works and meet some of the scientists working on this program.

Thank you very much.

[The prepared statement of Mr. Mason follows:]

SPACE BIO-SYSTEMS RESEARCH SERVICES
Simco Incorporated, 61 River Rd., Weston, CT 06883 (203) 227-0041

TESTIMONY OF STANLEY I. MASON, JR.
PRESIDENT, SIMCO, INC.

COMMITTEE ON SCIENCE AND TECHNOLOGY
H.R. 4326
SMALL BUSINESS INNOVATION DEVELOPMENT ACT
RAYBURN HOUSE OFFICE BUILDING

January 28, 1982

My name is Stan Mason. I am president and founder of three small corporations: Simco of Connecticut in Weston, Connecticut; the Masonware Corporation of Newport Beach, California and Simco of Texas in Houston. I am also the chairman of the Emergency Committee to Enact the Small Business Innovation Research Act of 1981.

In a capsule, it is our experience that the value of Federal funding of research in small high technology companies is in no way competitive to the funding of basic research in universities or in large corporations. In fact, such funding reinforces the symbiotic inter-relationship of mutual dependence and support among the three.

Certainly, a Federal allocation of 3% is small when you are talking about the big dollars going to basic research in universities and to support research in large businesses. We must look into what 3% can contribute in relationship to social and economic gains for the country. It is a multiplier, not a simple addition. There is no need to reiterate the statistics of previous testimony other than to remind ourselves that the majority of all patents come from individuals and small organizations and not universities and big business. Likewise, 80% of all new jobs are generated within small business and not by universities and large businesses.

Essentially, it is the risk-taking attitude and creative ability of the entrepreneurial spirit of small firms which is truly the economic driver for their personal as well as corporate income and growth: and subsequently, the payment of taxes which in turn support the universities and basic research. This economic driver does not exist within the incentive psyche of university staffs and researchers, and also does not exist within the mind of the corporate researcher.

Further, it has been our experience, in working with both universities and large companies, that each of these essential institutions are populated by brilliant and effective people with great capacity for accomplishment of tasks. One of the major skills we see being developed by the small high technology community is that of coupling the basic research generated within the university to the large corporations' strengths, producing major economic and social benefits.

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I brought some of the seeds along. In a moment, I will demonstrate one of their energy values.

It is really my pleasure to speak to the committee today about research and development in general, and about the potential of small business innovation in relation to universities and large companies. I bring you the view of a person who has lived his career in both small and large companies. These large companies had at least 30,000 to 50,000 employees.

I started my work at the U.S. Steel Corporation as a draftsman while in college. I developed my first invention there at age 21. It was the first level-winding constant speed wire drawing machine. They are still in use. After a stint as a pilot in World War II, I went to the Armstrong Cork company as an industrial communications trainee. Then to the Martin Aircraft company as a tool engineer. I quit Martin to set up a small plastic adhesives company, which I sold after three years. I rejoined Martin, where I became responsible for the technical proposals for the Titan, the Vanguard

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However, we are not ordinary consultants. We actually create and develop new products. We are not just a recommending group. These companies hire us not only for our innovative ideas, but also because we can often complete the work faster and cheaper than they could do the job internally. We bring a view of the outside world uncontaminated by internal politics or scientific prejudices.

In general, as a small broad-based group, we can exert more focused technical direction and financial control than they can. We can focus our thinking and put talent with greater special technical competency on the job than they can. We can assure more continuous management and follow-through on a project than they can. We can do this for two reasons: first of all we operate on a unique network principle in which we bring to bear our own scientific talents and those of a broad spectrum of associates within universities across the country with whom we have been working over the years. One might ask why our large company clients don't just hire the university people directly? Or why don't the universities persue their product development relationships themselves? The reason they don't seems to lie in the fact that the overt entrepreneurial spirit is not often found in either the university or within large organizations. There is a difference in the kind of people in large companies, university labs and small companies.

If a young technical man is good in a large company, and really good, and he is just out of college, he is assigned to work on the bench. His assignments stay within his technical skills for one or two years. Then he is promoted. He directs the work of others.

If he is really good, up the ladder of management he goes, and he is not dealing with the technical work anymore, the innovations or the inventions. He is signing vacation vouchers, decorating the office, and visiting customers. Except in organizations such as Bell Labs and others, the technical work really is left to the lowest level of people, the newcomer, the inexperienced person.

However, small companies are made up of some of the best of the scientists and technicians. They apply their technical expertise as it grows, to the technical problems and opportunities of invention and innovation.

Here I am, 60 years old and I have received more patents in the last 10 years since I have been in my own small business than I wrote for the 30 years previously. I was the same man all through my career, but just decided to do it for myself; the incentives for personal satisfaction and for financial reward cannot be compared. Also, and perhaps more importantly, innovative people are literally driven out of large companies due to subtle and sometimes overt pressures. I know, to make it in a large company you really must conform. If you do not, you are not promoted. You might even get fired.

To make it in a large company, it helps to be tall and handsome and articulate. It helps to be conservative and not innovative. You must not take chances with the company's money.

On the other hand, a man in the small company makes it on talent and not looks. He can share the results of his innovative nature in royalties and in shared ownership.

However, I am not attacking large companies or universities. Far from it. They are the heart of the country's strength. They have produced the wealth and the power that we are in America. They are also my customers, and the source of problem-solving talent.

However, this is the crux of my testimony: If small companies produce the most innovative ideas and products and jobs for the nation, why not help them? Give them the incentive of the 3%. This legislation is truly important to the future health of the country, both long and short term.

The equation is very simple. If a dollar put toward supporting R&D for a large company or university produces X return for the country, that same dollar supporting R&D in small companies will produce X times 50 or 100. It is a good proposition and with very low risk. It can be evaluated by dollars, or by public good in social and economic values.

It seems to me it is just a matter of priority. It is not that we want to give less emphasis to university or large corporate R&D. It is simply we want to recognize the potentiality of the small company R&D. We want to be sure the money is used in the most productive way.

Now: I want to tell you about this tallow project because it is an example of the support to small high technology companies: that which the NSF people have been giving, the model for this legislation.

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In spite of all these advantages and all of our work initially, we had a very difficult time getting any corporate interest in this crop mainly because corporate investment usually must be returned by the project in 2 years.

Then the people at the National Science Foundation heard about us. We actually did not seek them. They heard about the possibilities of the Chinese tallow and our work. They are really the innovative people.

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The point is, without the NSF incentive, the fine reputation of NSF, and the careful hands-off yet experienced science policy guidance from the small business people at NSF, Simco would have never organized a program with such drive and care and precision on its own. Perhaps the nation would never have had the opportunity for such a rich source of renewable energy as this Tallow tree offers. We really do need to press forward and allocate the 3% funding to small business research. It will return this sum, with large interest, year after year.

Now, I am going to burn one of these seeds for you. I am going to take one of the random seeds. I'll light it with a cigarette lighter.

The outside of this seed is white tallow, which is edible. It can be made into margerine or other foods or made into soap or candles. The inside is a liquid oil; a completely different kind of material from the outside. Once it gets started, you will see the outside burn, and in a moment, the inside will jet out in flame.

That is one little seed. Just imagine of the energy an acre of them will produce.

We squeezed a large number of these, put the oil in a German diesel engine test bed, and watched the computers as we switched from regular diesel to this oil. There was not a change in rpm or any power output. It was absolutely fantastic.

Thank you very much.

Mr. FUQUA. Thank you, sir.

Dr. Obermayer.

Mr. OBERMAYER. Thank you for the opportunity to testify before your committee today. I am gratified that this legislation which has been considered of utmost importance to the small business community is finally working its way through the Congress. As you are all aware, the bill in modified form has already been passed by the Senate and endorsed by the President.

Two years ago the White House Conference on Small Business voted this legislation as one of its top priorities. It ranked No. 6 out of many hundreds of small business initiatives considered. In addition it represented the principal small business initiatives to come out of the President's domestic policy review on industrial innovation. Five years ago, your committee had the distinction of considering and approving the first small business innovation research program that was funded at NSF. I personally have had a long history in supporting this legislation. Over 3 years ago in January 1978, I presented testimony to your committee in support of the SBIR program at NSF. What I said then is just as appropriate today, and therefore I am submitting a copy of my testimony of 3 years ago for the record today.

At that time, I told the story of the Wright brothers and the difficulties they encountered in trying to sell their first airplane to the Government. The point of the story was that Government bureaucrats just do not change by themselves. They have to be forced into action by our political leaders.

The Wright brothers' experience is a poignant story of a couple of bicycle shop operators who did not have the academic credentials but had the scientific and technical ability to do what no one before them was able to accomplish. In 1903, shortly before their first successful flight, a world renowned scientist, Prof. Samuel Langley, had tried to launch an airplane from the roof of a houseboat on the Tuspotomac River, right near here. On each of two separate attempts the airplane sank. After the failures of Professor Langley the bureaucrats within the Government were not willing to risk their reputations by funding the unknown Wright brothers. It took the Wright brothers 5 frustrating years after their first successful flight and the intervention of President Teddy Roosevelt to convince the Government to purchase an airplane from them.

In my previous testimony I compared the Wright brothers' experience with contemporary prejudices at NSF. During the 1960's and early 1970's, the NSF was the exclusive domain of academia. When small business or other potential performers of high quality scientific research approached NSF they were summarily turned away. After a long and careful review of the NSF operations, the Congress determined that NSF should open its doors and support the best research, whether it be carried out by universities, small business, or elsewhere.

The Congress tried to persuade the agency to broaden its scope but it did not produce the desired change with the agency. It was not until 1976 when Congress mandated a set-aside, initially of 7.5 percent and eventually of 12.5 percent of all applied research funds, that the agency started to take small business participation seriously.

The immediate reaction by NSF, even before the law was passed, was that it could not be done. They complained that it would lower the overall quality of the research program. They said there was not enough qualified small businesses to meet the set-aside program. Indeed, agency personnel did not know enough qualified small business people. Since the small business scientific community had found the doors closed at NSF, they had not bothered to make the contacts and cultivate the agency personnel. Now NSF would have to go beyond their favorite university sources and actively seek qualified business participants.

When the Congress forced NSF to respond, they found a way. To their surprise, they funded some very good small business research to meet the set-aside requirement. Most of the individuals within Government closest to the inner workings of the SBIR program have told me that the program never would have become or remained a reality without a mandatory set-aside. Word has gotten around within the small business community that there really is a small crack in a door that was formerly closed. As this program has evolved the number and quality of proposals submitted has continued to improve as small business recognizes the serious commitment by NSF.

Some program manager who had previously not recognized that small business could be a source of quality research, have completely changed their view and are finding that the bulk of their best research in fact is being carried out by small business. On the other hand for other program managers, small business participation at NSF remains an enigma. They use every tactic available to them to avoid small business involvement. Overall a lot of progress has been made at NSF but deep-seated prejudices take a long time to overcome. It is always preferable when a goal can be achieved by persuasion, but sometimes the strong arm of Congress is needed to effect change.

For more than a decade a variety of techniques have been used to encourage agencies to fund more R. & D. with small business but it has not been successful. Indeed, mandatory set-asides are not generally the preferred approach, but sometimes they represent the only approach that is likely to be successful. We need a set-aside here as an integral part of this legislation.

The institutions which are most actively and vocally against this bill are tied to those very same governmental agencies which for years have deliberately and aggressively prevented small business participation in their programs. The most obvious case in point is the National Institutes of Health. They have had the largest set-aside of all. One hundred percent of their research grants have gone to nonprofit. They have set things up so that almost all of their research opportunities were handled through their grant budget and then made small business ineligible to receive grants.

In other words, to correct this discriminatory practice, the Congress passed the Federal Grants and Cooperative Agreements Act of 1977 which mandated broader eligibility to receive grants. In 1978, the Director of NIH, Dr. Donald Frederickson, in a letter to Congress indicated that he intended to take action to comply with the new statute. Indeed, instead of compliance, they continued to postpone action by repeatedly publishing proposed changes in their regulations in the Federal Register, and asking for comments, but taking no action to make those changes.

These delaying tactics were very effective. Currently, their record of small business participation in R. & D. is the poorest of any major Federal agency. They are indicating again now that they have agreed to comply with the 1977 law. I am confident they will find some new way of excluding small business from serious participation if they are given half a chance. I would like to take what they say at face value, but after many years of words without action, I can only react to what has been done and not what is said.

Even in the face of these discriminatory practices at NIH, some small business research-based companies have found ways of dealing with the agency. In my written testimony I describe some of the subterfuges which have taken place. Small businesses or individuals do sometimes receive grants, but it is either by working through hospitals or academic institutions or by setting up nonprofit organizations using the same scientific personnel, but a different organizational structure.

Although resistance from the Government bureaucracy toward supporting small business is not a new phenomenon, I must admit that I have been quite surprised at the intensity of the response from certain academic and medical institutions to the legislation that is before you today. I sincerely believe and expect that my belief would be shared by the academics whom I quote in my written testimony, that in the long run this legislation will lead to significantly increased support for basic research at universities.

The bill is designed to focus on the linkage between basic research and practical application. This linkage which we call innovation has been shown in countless studies to be most effectively provided by small research businesses. The public supports basic research at universities because it expects it will ultimately benefit mankind, and it is the innovative entrepreneur who is best at converting the laboratory curiosity into a useful product or process.

When the Government invests in academic research without the corresponding support for technology transfer and small business innovation, it is doing a disservice to academia and society as a whole, because it is not providing the mechanism for eventual public utilization.

Further support for this view is provided by two university presidents from my hometown. My own business is in Cambridge, Mass., literally right across the street from MIT, and two subway stops from the center of the Harvard campus. Because of the late time, I will not quote them directly. Rather, I will skip that part of my oral testimony. The specific quotations can be found in my written statement.

The president of Harvard University, in his report this past year to the board of overseers of Harvard, and Paul Gray, the president of MIT, have both stated clearly that they are concerned with technology transfer and strengthening their ties with the industrial and small business community. They feel that ultimately the practical utilization of basic research by society is essential to the long-term public support of basic research.

All of us in this Nation must learn to work together. We must look beyond our narrow parochial perspectives and see a land of individuals and institutions cooperating to improve the health of our economy and the health of our people. Some reasonable level of cooperation between academia and small business is developing in my microcosm in Cambridge, Mass., and I hope it can be extended to the rest of the country. We have an opportunity in this legislation to develop a synergistic relationship where a technical entrepreneur can accelerate the rates at which the fruits of academic research become of direct value to mankind.

Three years ago I stated before your committee words which are probably even more true today. I said then:

> We must make certain this bill is given proper support and does not fall victim to bureaucracy or policial pressure. This bill could potentially be the most signficant Government program of this century in the field of science and technology.

Indeed, you have the opportunity here to make history by supporting a bill which could have tremendous long-term impact on our economy and our society.

Thank you.

[The prepared statement of Arthur S. Obermayer follows:]

Testimony Prepared for the Hearings of
U.S. House of Representatives,
Committee on Science and Technology on
The Small Business Innovation Development Act of 1981
HR 4326

January 28, 1982

by
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It is great pleasure for me to testify before your committee today. I am gratified that this legislation, which has been considered of utmost importance to the small business community, is finally working its way through the Congress. As you are aware, this bill in modified form has already been passed by the Senate and endorsed by the President. Two years ago, the White House Conference on Small Business voted this legislation as one of its top priorities. In addition, it represented the principal small business initiative to come out of the President's Domestic Policy Review on Industrial Innovation, but unfortunately it was never implemented by the agencies. Five years ago your Committee had the distinction of considering and approving the first Small Business Innovation Research Program which was funded at the National Science Foundation. I personally have had a long history of supporting this legislation. Over three years ago, in January 1978, I presented testimony to your Committee in support of the Small Business Innovation Research Program at the National Science Foundation. Of all testimony, talks and papers I have given over the years, I believe this has been disseminated more broadly by trade publications and other media. What I said then is just as appropriate today, and therefore I am submitting that testimony for the record.

At that time I told the story of the Wright Brothers and the difficulties they encountered in trying to sell their first airplane to the government. The point of the story was that government bureaucracies don't change by themselves. They have to be forced into action by our political leaders. The Wright brothers experience is a poignant story of a couple of bicycle shop operators who did not have the academic credentials but had the scientific and technical ability to do what no one before them was able to accomplish. In 1903, shortly before their first successful flights, a world renowned scientist, Professor Samuel Langley, had tried to launch an airplane from the roof of a houseboat on the Potomac River, but on each of two separate attempts the airplane sank. After the failures of Professor Langley the bureaucrats within the government were not willing to risk their reputations by funding the unknown Wright Brothers. It took the Wright Brothers five frustrating years after their first successful flights, and the intervention of President Teddy Roosevelt, to convince the government to purchase an airplane from them.

In my previous testimony I compared the Wright Brothers' experience with contemporary prejudices at the National Science Foundation. During the 1960's and early 1970's, the National Science Foundation was the exclusive domain of academia. When small business or other potential performers of high quality scientific research approached NSF, they were summarily turned away. After long and careful review of the NSF operations, the Congress determined that NSF should open its doors and support the best research whether it might be carried out at universities, small businesses or elsewhere. The Congress tried to persuade the agency to broaden its scope through questions asked at hearings, statements of objectives in committee reports, and wording included in the authorization acts. But none of this produced the desired change within the agency. It was not until 1976, when the Congress mandated a set-aside initially of 7 1/2% and eventually of 12 1/2% of all applied research funds that the agency started to take small business participation seriously. The immediate reaction by NSF, even before the law passed, was that it couldn't be done. They complained that it would lower the overall quality of their research program. They said that there were not enough qualified small businesses to meet the set-aside requirement.

Indeed, agency personnel did not know enough qualified small business people. Since the small business scientific community had found the doors closed at NSF, they had not bothered to develop contacts and cultivate the agency personnel. Now NSF would have to go beyond their favored university sources, and actively look for qualified small business participants. When the Congress forced NSF to respond, they found a way. To their own surprise, they funded some very good small business research and eventually developed the Small Business Innovation Research program to meet the set-aside requirement. Most of the individuals within government closest to the Small Business Innovation Research program have privately said to me that this program never would have become, or remained, a reality without a mandatory set-aside which forced NSF to provide small business opportunities. Word has gotten around within the small business community that there really is a small crack in the door that was formerly closed. As this program has evolved, the number and quality of proposals submitted has continued to improve as small business recognizes the serious commitment by NSF. Some program managers who had previously not recognized that small business could be a source of high quality research have completely changed their view and are finding that the bulk of their best research is being carried out by small business. For other program managers, small business participation at NSF remains an anathema; they use every tactic available to them to avoid small business involvement. Overall a lot of progress has been made at NSF, but deep seated prejudices take a long time to overcome.

It is always preferable when a goal can be achieved by persuasion; but sometimes it takes the strong arm of the Congress to affect change. For more than a decade, a variety of gentle techniques have been used to encourage agencies to fund more R&D with small business, but it hasn't been successful. Indeed, mandatory set-asides are not generally the preferred approach, but sometimes they represent the only approach that is likely to be successful. We need the set-asides which are an integral part of the legislation under consideration today. It is too late to examine alternatives; they are presented now primarily to postpone, confuse and prevent the passage of this bill.

The institutions which are most actively and vocally against this bill are tied in with those very same governmental agencies which have for many years deliberately and agressively prevented small business participation in their programs. The most obvious case in point is the National Institutes of Health. They have had the largest set-aside of all; 100% of their research grants have gone to non-profits. They set things up so that almost all of their research opportunities were handled through their grant budget and then made small business ineligible to receive grants. In order to correct this discriminatory practice, the Congress passed the Federal Grants and Cooperative Agreements Act of 1977 (P.L. 95-244) which mandated broader eligibility to receive grants. In 1978 the Director of NIH, Dr. Donald Frederickson, in a letter to the Congress indicated that he intended to take action to comply with the new statute. Instead of compliance they continued to postpone action by repeatedly publishing proposed changes in their regulations in the Federal Register and asking for comments, but taking no action to make the changes. They managed to violate the intent if not the letter of the law for four years. These delaying tactics have been very effective; currently their record of small business participation in R&D is the poorest of any federal agency. They are indicating again now that they have agreed to comply with the 1977 law, but I am confident they will find some new way of excluding small business from serious consideration if they are given half a chance.

Even in the face of these discriminatory practices at NIH some small research based businesses have found ways of dealing with this agency. A procedure that is often successfully used is for the small business to write up the technical proposal for a grant application and then find a medical institution or university through whom to submit it. When the grant comes through, the non-profit takes it's cut for administering the grant and they award a subcontract to the small business to carry it out.

My own company found another solution to the NIH problem. When we approached NIH two years ago we were told officially that we were not eligible for a grant but that this kind of research would be of interest to them if it were proposed by a non-profit organization. Then a friend told me that another practical way to deal with NIH is to set up a non-profit organization. Therefore, we had our lawyers set up Moleculon Research Institute as a legal, non-profit organization occupying the same space and using the same personnel and facilities as Moleculon Research Corporation. Our non-profit's first application for an NIH research grant successfully went through their peer review system, and was approved for funding which we are currently awaiting. We may have found a practical way of getting around their discriminatory practices but I resent being forced to resort to a subterfuge, and I resent the unfounded prejudices against small businesses within government, academia and medical institutions. I agree with those who say that research funds should go to the best performers, but first it is necessary to eliminate discriminatory practices and attitudes and then the doors must be opened wide enough to attract the best small business performers.

Although resistance from the government science bureaucracy toward supporting small business is not a new phenomenon, I must admit that I have been quite surprised at the intensity of the response from certain academic and medical institutions to the legislation currently before you. I sincerely believe, and I would expect this belief would be shared by the academics whom I will quote in a minute, that in the long run this legislation will lead to significantly increased support for basic research at universities. This bill is designed to focus on the linkage between basic research and practical application. This linkage, which we call innovation, has been shown in countless studies to be most effectively provided by small innovative businesses. The public supports basic research at universities because it expects that it will ultimately benefit mankind, and it is the innovative entrepreneur who is best at converting the laboratory curiosity into a product or process that will benefit mankind. When the government invests in academic research without the corresponding support for technology transfer and small business innovation, it is doing a disservice to academia and society as a whole because it is not providing the mechanism for eventual public utilization.

For example, a few years ago I was involved in setting up the Congressionally mandated National Science Board Public Forums which were held throughout the country to show the public the benefits of science and the type of research NSF supports. However, the entire focus of the Public Forums was on the applied research sponsored by NSF which, in fact, represented less than 10% of the overall NSF budget. NSF clearly believed that it was their applied research that provided the clearest examples for the public of why all NSF research was in the national interest. They found the importance of the basic research, which represented 90% of the NSF budget, was much harder to explain and justify.

Further reinforcement for this view is provided by recent statements by my home town university presidents. My own business is in Cambridge, Massachusetts - right across the street from MIT and two subway stops from the center of the Harvard campus. These universities - especially MIT - interact closely with the local small business community - they realize that synergism between academia and small business is important to the vitality of their institutions. To quote them directly Paul Gray, President of MIT stated in an article in the Sunday, New York Times of September 26, 1981, which has subsequently been circulated widely by MIT, that: "Creative thought does not in itself insure the transfer of invention to the world in a useful way. Consequently, it is important that we continue to foster cooperative activities between universities and industry that will help assure the vitality of important research progress, the rapid and effective transfer of new technologies and the relevance of educational programs to important problems in society." Then he went on to say that "The growing concern that discoveries find practical application to enhance our productivity and our competitive edge would by itself argue compellingly for [reinvigorating a research relationship with industry]."

Derek Bok, President of Harvard, echoed these comments in his Annual Report to the Board of Overseers which was reprinted in Harvard magazine last May. He stated: "One topic that has received increasing attention is the speed and efficiency with which we are able to translate scientific knowledge into useful products and processes. After all, the United States spends larger sums on scientific research than any other nation, and the overall quality of that research is widely believed to be second to none. Surely, then, one promising way of trying to stimulate innovation, and ultimately productivity, is to find better methods of combing the store of scientific knowledge to find new technological breakthroughs that could result in labor-saving devices or even new products and industries. In short, we must work harder at the process referred to somewhat clumsily as technology transfer." To this he added: "Moreover, academic officials and scientists are certainly aware that masssive federal appropriations for campus-based research are largely based on a conviction that this work will eventually lead to practical results. Hence, it is only prudent for universities to take a serious interest in the process of translating scientific knowledge into commercial uses."

We are at a point in history where all of us in this nation must learn to work together, where we must look beyond our narrow parochial perspective, and see a land of individuals and institutions cooperating to improve the health of our economy and the health of our people. Some reasonable level of cooperation between academia and small business is developing in my microcosm, i.e., Cambridge, Massachusetts and I hope it can be extended to the rest of the country. We have an opportunity in this legislation to develop a synergistic relationship where the technical entrepreneur can accelerate the rate at which the fruits of academic research become of direct value to mankind. Three years ago I stated before your committee words that are perhaps even more true today. I said that we must "make certain that [this bill] is given proper support and does not fall victim to bureaucratic or political pressures. [This bill] could potentially be the most significant government program of this century in the field of science and technology." Indeed, you have the opportunity here to make history by supporting a program which could have a tremendous long term impact on our economy and our society.

Mr. **Fuqua**. Thank you very much, Dr. Obermayer, and we thank all three witnesses who have testified this morning.

On several occasions, the NSF program was mentioned as being very worthwhile. Dr. Mason cited an example. Now that is funded at approximatley $5 million a year I believe. Is that correct? I think it is around $5 million.

Questions have been raised as to whether expanding a program of that type where it has been funded at $5 million, to approximately $400 million, or $1.2 billion, depending on the figures that we use, whether or not that can be adequately absorbed in the private sector.

Could either of you three comment on that?

Mr. **Mason**. I can take a stab at it.

It occurs to me that in these electronics companies, in all these large research and development divisions of large corporations and universities, there are undercover entrepreneurs. They do not quite have the courage to make the step themselves, to set up small organizations. If they had this incentive and this support, you would find all kinds of new products, processes, techniques, all kinds of new things available to the Government or to the people. This kind of support would be magnificent incentives for innovation.

Mr. **Fuqua**. One of the cases in the NSF program, they received I think something in the neighborhood of 5,700 applications for their funding program. In the life sciences area there were only 36 from profit organizations. Now could we achieve the research, are there enough people in small business, there, who could do that research?

Mr. **Obermayer**. The NSF generally avoids funding research in the life sciences because this field is considered the exclusive domain of NIH. Therefore, there have been few opportunities in the life sciences at NSF.

A more specific response to your question has been provided by Mr. Richard DeCicco of Technology Catalysts, Inc. who testified on September 1981 before the House Small Business Committee. He has assembled a data base of small research based businesses and their field of specialty. When he was asked how many small businesses have the qualifications to do research in the health and life sciences, he went back to his data base and came up with 3,500 companies. I understand that that is the most reliable data available.

Mr. **Fuqua**. That would be qualified as small business?

Mr. **Obermayer**. Yes.

Mr. **Fuqua**. Do you believe that the legislation that requires uniformity of agency SBIR programs is too constraining to allow effective administration of the act?

Mr. **Obermayer**. A 1-percent set-aside would certainly not be constraining to any agency, and a 3-percent set-aside would be a reasonable minimum for most agencies. The important point is that there be provisions for some minimal percentage so that small business has an opportunity to prove to the agencies what it can do. It must allow small business to get its foot in the door so to speak, and that is what the issue is really all about.

Mr. **Fuqua**. To see if it works?

Mr. **Obermayer**. That is right.

Mr. Fuqua. And maybe silent the critics?

Mr. Obermayer. Exactly; 3 percent to me is not the issue. It is that the door be opened. In fact, the Senate version, which I feel is reasonable, starts off at two-tenths of 1 percent, which is really a relatively small amount of money and only reaches 1 percent after a number of years. We would have an opportunity to see how well it works.

Ms. Eskesen. In the floor debate on this bill in the Senate, Senator Danforth of Missouri withdrew his cosponsorhsip of the bill because he argued that the academic community had presented the program as one of the "camel's nose under the tent;" that is; that with our appetite whetted with 1 percent this year, what was to prevent us coming back for an increase for, I believe he quoted 85 percent next year.

I think it is important to note that one of the extra characteristics of this entire process is not to develop the scale of the SBIR program, per se, but to draw into the standard operating procedures, many who are not at the moment in that process. If I might suggest, it is an example of the "devil you know" syndrome.

The lines of communication simply are not there between those of small business research competence and those within the Federal agencies who are awarding grants and contracts and if the concerns on both sides—and there are some real horror stories on both sides of dealing with each other—can be allayed by the fact of working together within the context of SBIR, I think a very likely impact is going to be more small businesses are going to be functioning within the normal granting and contracting operating procedures for research and development. At the moment, that does not take place at all and one expectation is that it could probably be very significant.

Mr. Fuqua. Dr. Mason?

Mr. Mason. I would like to comment in a different direction. Some of these firms that hire my company asked us to look into the future as best can be done, to try to understand what can happen in the future, not in terms of extrapolation of what is currently here but in terms of what the future can be.

One of the views that we talk about is the expansion of the so-called cottage high technology industry where a scientist has a computer terminal and therefore he has access to some of the best libraries in the world. He can work his research with a blackboard and a computer and a calculator and can do significant research, in his spare room.

He can then network with other people in other remote locations and have an organization and a company which can put together an effective proposal and accomplish very fine science.

Remember, this is the brain drain that was talked about a moment ago; a brain drain coming from Europe. They brought no facilities with them. They brought their brains and that is all.

So I can see many, many, many expanded small R. & D. operations in cottages. And where will these people come from? They will come from the universities and the large industries.

Mr. Fuqua. Thank you. Mr. Gore.

Mr. Gore. Thank you, Mr. Chairman.

Let me just briefly touch on one issue that you mentioned in passing, Dr. Mason. During the hearings that I chaired this summer, we found that this factor of validation or recognition conferred by the SBIR grant was really critical, that is, when a small company has an idea, and it approaches a venture capitalist, the venture capitalist is facing a real uncertainty hurdle.

They are wondering, "Is this guy a screwball? Is this idea one that hits or one that just misses or one that is completely off the mark?"

Well, if that same small inventor or small researcher has survived the rigorous and objective peer review process built into the SBIR program, and has gotten the money in the phase I award, then the recognition or validation which goes along with the money is often just as important or more important.

We found example after example of companies that had been unable to raise any money at all, they get a small, very tiny grant from SBIR, which is recognition of the fact that they survive peer review and that the idea is too crazy, that it has got some merit, and then they go back to the venture capitalist and they raise three, four, five, six times as much as what the initial award from SBIR is, so it is that validation factor that is really important. Don't you agree?

Mr. MASON. Absolutely true. After we got the first NSF grant, and it was published, we had telephone call and letter after letter from, for example, the largest soap company in the world, a large oil company. Also, I must say, there were a number of Japanese organizations who were there with wires and letters and telephones and a barrel of mail; that is absolutely right.

Mr. FUQUA. But that didn't happen before the grant, did it?

Mr. MASON. No. As a matter of fact, we had lots of mirth and humor when we proposed the Chinese tallow as a project, so you are right.

Mr. FUQUA. They thought this is some screwball.

Mr. MASON. That is right. The recognition is important in changing people's minds, and they like to be on the winning team; they will not take a risk. It is insurance.

Mr. FUQUA. You know that is right, and if you look again at the advantages that our country has in this global war, of trade war and business war in the midst of an accelerating scientific revolution, we see hundreds of thousands, if not millions, of bright individualists—which is what Americans are—out there who have received the finest education that the world can offer.

Then you see this big research and business complex that swallows them up often—often, not always—but what we need to do is to fashion a way for the American people working through the Government to reach out and tap the minds of these individualists who have ideas and particularly in the midst of the scientific revolution have more and more good ideas, to tap those ideas and bring them to a stage where they can have enough validity and confidence to go to the capital markets in this time of ridiculously high interest rates, and get some support to carry them the rest of the way, to help this country participate in the scientific revolution and the profits that will come from it.

There are a lot of other things that I would like to ask the three of you. I didn't hear very much that I disagreed with. The success stories out of this program are just so numerous. I daresay the individual that was mentioned in the last panel, that could have gotten money elsewhere, it was said—I daresay that that validation issue is important there.

Maybe he could have gotten money after the validation but beforehand might have been difficult. I want to recognize Mrs. Heckler, who has been a real leader in this effort. I will forgo the many other questions that I would ask if we weren't pressed for time.

Mrs. HECKLER. Thank you very much. I would like to congratulate the panel. I think you are excellent and also nonduplicative. As so often happens, we hear each one reframe the same points made by the other, and in each case each made a very unique contribution. I want to say, Dr. Mason, I first thought you brought the wrong sample. Masonware sounded better.

Mr. MASON. Thank you.

Mrs. HECKLER. As I watched the tallow I was amazed. I can't imagine—and I am so sorry that the press wasn't here and that we didn't have a photographer. Really, we missed the best moments because that was just the most stimulating presentation that could have been offered on the issue.

Obviously, I am very sympathetic to the points that you have raised, but I would like to just go back to the points raised by the prior panel, which rather surprised me, in view of the fact that we have worked very effectively with their organization and if they represent, indeed, many small high-technology companies, how would you explain the differences in the two presentations? Could one of you answer?

Mr. MASON. I would like to answer that question. It occurred to me once upon a time I worked at the Martin Co., and the big problem there was—this was after World War II—how do you stop building airplanes and make some consumer products? I just wondered, of these people in the electronics business, how much of their success is due to Government contracts for military-directed projects—to the need for radar and airplanes and computers to figure out ranges and that sort of thing?

Now, the other thought that came to my mind was—is—the Japanese competition. I looked at the Japanese plans for electronic expansion in the next 10 years, and I remember smiling when I read about 10 years ago about a company called T-o-y-o-t-a. They said they were going to get into the automobile business, and beat General Motors and I said, "Hell, I can't even say their name. How can they do that?"

And they did. Now, I look at their plans for expansion of computer sizes and miniaturization of small electronic parts, and I wonder if the electronic people are worried about this bill inspiring more spinoffs, as this man called it, when an employee goes off and starts a new company. I just wonder those two questions.

Mrs. HECKLER. Dr. Obermayer.

Mr. MASON. Is there anybody here who can answer that?

Mrs. HECKLER. I don't know the answer but you pose interesting questions. Perhaps Dr. Obermayer can.

Mr. OBERMAYER. I think that is a realistic concern of both larger companies and the universities. No institution feels comfortable about allowing spinoff organizations that may eventually compete. A recent article in the Boston Globe about this bill expressed the concern of university administrators that this bill would allow researchers in the universities to go out and start their own companies. Yes; perhaps that would happen, but I would not consider that a negative.

In response to your earlier question, I think the Zschau/Knapp panel really was talking about a different kind of small business than we are. The experience at the National Science Foundation has been that the average SBIR recipient has something like 10 employees, whereas both of the previous witnesses represented companies with many hundreds of employees and sales in excess of $10 million.

This program is really designed for the individual inventor/entrepreneur and the very, very small company. That is where the program should be focused because that is where the major innovations come from—individual inventors and very small companies. The SBA definition of small company is not the appropriate one to use here.

When Knapp talks about investments in startups, he means a company that has completed the R. & D., has a few-year operating history, and has over 100 employees. To me that is not a startup.

It so happens that I have considerable familiarity with the venture capital community. Currently, I am president of Zero Stage Management Co., an organization that invests in truly young, small, high-technology businesses. The principals of our organization feel that the SBIR program can be of major value to us because it will stimulate the appearance of more good investment opportunities and it will allow us to examine situations after the initial R. & D. funding has demonstrated technical feasibility.

The traditional venture capitalist seeks investment situations requiring at least $1 million. He is not interested in considering investments requiring initial funding of only $25,000 to $50,000 for feasibility demonstration. The venture capitalist will spend that much money just evaluating whether a particular investment should be made. Unless someone is wealthy or has wealthy friends, he cannot find investors for the very early stage of a company. The SBIR program can fill this gap in the very early stage of the innovation.

It is very difficult to find an investor for someone who says, "I have an idea but I haven't shown that it works." It is not an investible idea until someone can show that it really can be made to work, that is, until its feasibility can be demonstrated. The SBIR program fills this gap.

Ms. ESKESEN. Can I add to this question of the availability of venture capital? I would hazard a guess that the individual referenced by the last panel lived in either Massachusetts or California. The fact is that both those two communities receive a major proportion of the NSFSBI awards. I believe in the first solicitation it was one-third to Massachusetts, one-third to California, and one-third to the balance of the country.

It is also a characteristic of both those communities that there is a well-established tradition of involvement by what we prefer now to call as the informal venture capital community in those types of firms.

What I find very exciting about the SBIR program is not where the two major sources of technical innovation were figured, but the fact that one-third of the awards were made to the rest of the country which is not known for innovation, and similarly not known for the availability of the informal venture capital from private individuals.

These sorts of communities growing up in Colorado, in Minneapolis, Minn., in the Research Triangle in North Carolina are communities that lack that basic ingredient that both of the other two successful communities have, which is a long tradition of entrepreneurs, successful themselves, who then subsequently invest in early stage startups.

It is what I usually refer to as the grandparent-parent syndrome. These people are usually men in their fifties—with due respect to Arthur—who have gone through the excitement of being in a startup firm, but frankly do not want the hassle of the 2 o'clock feedings anymore, and so they do it by being involved financially rather than the day-to-day hassle of those firms.

The very exciting thing about the SBIR program, as it is perceived, is that a flood of money becomes available to the other 48 States to develop that same sort of innovative base that has had such a dramatic impact on the economy, in Massachusetts specifically.

Mrs. HECKLER. It is a very idealistic point. Of course, from a more provincial standpoint, I might be persuaded to take a different view.

Ms. ESKESEN. But wouldn't you agree, Mrs. Heckler, that Massachusetts in this recession has been far less impacted than they were in the recession of the early seventies, and in large part because of the broadened job base?

Mrs. HECKLER. Yes, I certainly would agree with that, but I wish the cushion to expand.

Ms. ESKESEN. Indeed.

Mrs. HECKLER. Not to contract.

However, that argues to the point that I made earlier, which was that I believe this is in the national interest. I really believe it is a mistake to characterize this proposal as the response or bone to a special interest constituency.

Ms. ESKESEN. Absolutely.

Mrs. HECKLER. I think it is the most demeaning characteristic of the idea that one could suggest, in view of the impressive gains of the small business community in the country, but I think that Dr. Obermayer has made an interesting point in the sense that our data is not sufficiently detailed to point out the differences.

We use the term "small business"; and we could be talking about a firm of 1 to 500, or a fairly large firm in terms of the magnitude, and so what we are really talking about here are much, much smaller shops.

And that is also, as we hear from Dr. Mason, the kindling ground for some very brilliant ideas, and vast change and major breakthroughs. But they don't necessarily involve enormous plants or structural changes or even physical presences.

A very small team can make an enormous breakthrough, so that this characterization—we are going to have to break down our data for the Congress, I think, to make it more relevant to the real world of small business as it exists.

Ms. **Eskesen**. If I can assist you in that process, the figures quoted by Dr. Zschau of small companies being identified as companies with $5 million or less in equity, that factor is out to a company doing approximately $20 to $25 million in sales, which is a fairly well-established small firm.

We are talking primarily of a company which is in the very early stages and is probably doing a volume of sales very much lower than $1 million.

Mrs. **Heckler**. As you probably know, Senator Schmitt, during the Senate debate, offered an amendment that was readily accepted, which would protect the basic research from more than the 1 percent set-aside, and Senator Ludman was quoted at the time as saying, "It strengthens the bill."

Would you agree with that, allowing removing basic research, Dr. Obermayer?

Mr. **Obermayer**. Yes, I think that is perfectly reasonable.

Ms. **Eskesen**. I think all of us have a problem and it has been evident by the discussion of what is meant by basic as opposed to applied research. Arthur and I have spent long hours these last several weeks discussing precisely that point.

The difficulty is that precisely the same activity can be differently identified. What really is the distinction to be made is what is the most innovative for the conduct of the research. The activity within the university context is predominantly focused toward development of paper and professional presentations that make available that information.

The activity conducted of exactly the same type within the context of a small business is more usually focused toward the problem, application and the market penetration.

Mrs. **Heckler**. Well, then perhaps, Ms. Eskesen, you would be able to help us develop some language for the report on the subject of the definition. I think it is important in the report——

Ms. **Eskesen**. It is.

Mrs. **Heckler** [continuing]. To set some parameters so that we would know.

Mr. **Mason**. It seems as though you have to get into theology, you know, the difference between high technology and low technology began, I suppose, back in Greece, where they had this heavens above and the Earth below; and you had a group of people counting the angels on the head of a pin. Don't separate basic science from applied science. Keep it all in one ball. You can't quite separate it.

Mr. **Obermayer**. I would like to give an example from my own company. A major new research area that my company is getting into is in the transdermal drug delivery product field, drugs that can be delivered directly through the skin into the bloodstream.

All of our research in this field is currently commercial, none of it is for the Government at this point, but however, we are in the process of submitting a proposal to NIH from our nonprofit affiliate to study the fundamentals of transport of drug solutions through the skin.

Now this fundamental study is clearly considered basic research, but why are we interested in doing it? Because our ultimate goal is to learn enough about the fundamentals so that we may be better able to develop practical drug delivery systems that can be made available for human use.

Mrs. **Heckler**. Another issue that has come up in terms of the differences between the House and Senate versions of the bill would be the question of the exclusion of intramural research by the agencies. Now, for some time I have been on the Veterans' Affairs Committee, and I have been extremely proud of the research done at the Veterans' Administration, and it has been under most difficult conditions, and of very high quality and received international recognition, as you know.

The Veterans' Administration, as one agency, does not wish to have the intramural research, which they conduct involving their own employees, affected by a set-aside, and this is the attitude that I find in other fields, although I am most familiar with the Veterans' Administration.

How would you feel about the exclusion fo the intramural research from the bill, Dr. Obermayer?

Mr. **Obermayer**. I am not sufficiently familiar with the intramural research program at the Veterans' Administration to provide a direct response but I do know that one of the most successful programs at the National Science Foundation has been the program on aid to the handicapped. This is an area which has gained very little support anywhere else in Government, and there aren't the normal commercial incentives, because there are relatively few people who would need a particular aid. Research programs on aid to the handicapped should be of great interest to the Veterans' Administration and elsewhere.

Mrs. **Heckler**. Are there other comments?

Mr. **Mason**. Large companies have the same problem. They have many different product areas, and periodically in almost any company they change management directions. and one president will allow each of the subpresidents to have his own R. & D. Then the next man who comes in will say, "We are having a revolution, we will put R. & D. all under one so we will be able to have corporate goals."

It is always a problem. I lean toward the corporate goal, and I therefore, because of that experience, would lean toward a centralized understanding of funding and the research gets funded where it is needed most as seen from above.

Mrs. **Heckler**. By "big brother" Government, sir?

Mr. **Mason**. No, but by a panel of qualified people.

Mrs. **Heckler**. Do you have any comments?

Ms. **Eskesen**. I think that is an important point, that the panel of qualified people has in the past not been entirely representative of the total scientific research community, and where there is common ground to be found in the debate that is being held, I think it lies in creations of mechanisms that enable an important voice that has been to this point omitted to be included in the decisionmaking process.

Mrs. **Heckler**. I believe that is central to the whole point. I think, actually, we are almost at a crossroads in terms of this breakthrough, and I am consoled, Dr. Obermayer, that you are interested in the Senate version of the bill, because I personally feel, from a practical, pragmatic, political point of view, that getting the foot in the door is the beginning, and I am not at all anxious to see 85 percent of the research taken over, but if it can be better performed, I would reexamine that.

I think those who are intimidated and threatened by the future share of the market argument suggest some inadequacies in terms of their own dealing with the basic missions that they are about to accomplish, but I do think that realistically today that we are looking at a bill that offers great promise in a broad sense and arouses more articulate opposition from well-trained and highly skilled people than I expected.

I have personally been lobbied extensively by very unusual groups, by universities and so forth, and not Derrick Bach and Paul Gray, I will say, but many others of prominence. I personally feel I am supportive of the bill, and I personally think the small business community has been excluded.

I think the set-aside program in general, despite the academic differences, the set-aside is characterization in this Congress, so the fact is that we have had very bad experiences with set-asides in some cases, and in fact projects have gone unfunded because they didn't find the qualified bidder, because the set-aside required only certain qualities, and the funding to go to certain constituencies who are not forthcoming.

This is an argument that is raised here. I don't think it is going to be a valid one, but if the threshold of entry is small, and it is phased in gradually, then you avoid the problem.

What we are going to look for, I think, in the committee will be the right responses, but interestingly, this is one of the few bills that is going to, I think, be considered by about six committees of the House, and it will be so thoroughly aired that, if we had perhaps given the same scrutiny to the tax package or the Economic Recovery Act, we might have produced a better product.

But I do think that we are going to produce a good product. I think you have added immeasurably to the debate today, and I hope that we will keep the record open for your future comments.

I want to say, Dr. Obermayer, you have been very courageous in your clear characterization of where the problem lies, and I think it has to be stated that there has been—I believe not a conscious one; perhaps so, but I would prefer to think not—but a bias, because the spectrum has been limited and narrowed to those who are in a certain network already and not broadened beyond it.

You have been a superb panel and I have no further questions.

Mr. **Gore**. Thank you very much. It has been a most interesting panel. Let me just ask one final question. Dr. Obermayer, you are a very careful student of the NSF history and program. Do you think that the SBIR program at NSF could have worked without the use of this blunt set-aside requirement?

Mr. **Obermayer**. Absolutely not. It was a necessary component. Both the supporters and opponents of the program within NSF would agree that the program would not have existed without the set-aside.

Mr. **Gore**. Well, that is a critical point, because the principle of the set-aside, one of the problems that a lot of thoughtful opponents of this legislation have, but you know the relationship between the Congress and the departments of the executive branch; it is always difficult, and if you just conduct a civil conversation saying we would like you to do this and we would like you to do that, we have got a lot of other things going on and they have got a lot of their priorities, and there are a lot of reasons why it is hard to get to tomorrow, the next day, the next month or the next year.

And sometimes if the Congress decides that a principle is important enough, and if Congress decides that an opportunity is ripe enough, and if there is a record of success that is attractive enough, like the SBIR program, then a rather blunt statement is justified, knowing that without making a blunt statement you are not going to get the message across.

That is the history at NSF, and it has been the history elsewhere as well, so I think that your testimony is very eloquent in that regard.

All of you have been excellent. We certainly appreciate your presence here today. You have made great contribution, and with that we will adjourn.

[Whereupon, at 12:50 p.m., the subcommittee adjourned.]

APPENDIX I

97th CONGRESS
1st Session

H. R. 4326

[Report No. 97–349, Part I]

To amend the Small Business Act to strengthen the role of the small, innovative firms in federally funded research and development, and to utilize Federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the Nation's economy.

IN THE HOUSE OF REPRESENTATIVES

July 29, 1981

Mr. LaFalce introduced the following bill; which was referred to the Committee on Small Business

November 20, 1981

Additional sponsors: Mr. Mitchell of Maryland, Mr. Smith of Iowa, Mr. Addabbo, Mr. Gonzalez, Mr. Bedell, Mr. Richmond, Mr. Nowak, Mr. Luken, Mr. Ireland, Mr. Skelton, Mr. Evans of Georgia, Mr. Stenholm, Mr. Mazzoli, Mr. Mavroules, Mr. Crockett, Mr. Hatcher, Mr. Wyden, Mr. Eckart, Mr. Dorgan of North Dakota, Mr. Savage, Mr. Roemer, Mr. Fary, Mr. McDade, Mr. Conte, Mr. Stanton of Ohio, Mr. Broomfield, Mr. Marriott, Mr. Williams of Ohio, Mrs. Snowe, Mr. Daniel B. Crane, Mr. Hiler, Mr. Staton of West Virginia, Mr. Weber of Minnesota, Mr. Daub, Mr. Smith of New Jersey, Mr. Weber of Ohio, Mr. Dreier, Mr. Molinari, Mr. Siljander, Mr. Akaka, Mr. Atkinson, Mr. Barnard, Mr. Barnes, Mr. Bevill, Mr. Bonker, Mr. Bowen, Mr. Brown of Ohio, Mr. Clay, Mr. Clinger, Mr. Coelho, Mr. Corrada, Mr. D'Amours, Mr. Daschle, Mr. Dixon, Mr. Dunn, Mr. Dwyer, Mr. Edgar, Mr. Fauntroy, Ms. Ferraro, Mr. Fish, Mr. Foglietta, Mr. Ford of Tennessee, Mr. Frank, Mr. Gejdenson, Mr. Gingrich, Mr. Glickman, Mr. Green, Mr. Hansen of Utah, Mr. Horton, Mr. Hoyer, Mr. Hughes, Mr. Kildee, Mr. Kogovsek, Mr. Lantos, Mr. Leach of Iowa, Mr. Lewis, Mr. Lowery of California, Mr. Lundine, Mr. McHugh, Mr. McKinney, Mr. Madigan, Mr. Markey, Mr. Marks, Mr. Martin of New York, Mrs. Martin of Illinois, Mr. Mica, Ms. Mikulski, Mr. Montgomery, Mr. Murphy, Mr. Neal, Mr. Nelligan, Mr. Patterson, Mr. Porter, Mr. Pritchard, Mr. Rahall, Mr. Railsback, Mr. Rodino, Mr.

ROE, Mr. ROTH, Mr. SEIBERLING, Mr. SOLOMON, Mr. STANGELAND, Mr. SUNIA, Mr. VENTO, Mr. WEAVER, Mr. WILSON, Mr. WIRTH, Mr. WOLPE, Mr. WON PAT, Mr. WORTLEY, Mrs. COLLINS of Illinois, Mr. FAZIO, Mr. MITCHELL of New York, Mr. DYSON, Mr. STOKES, Mr. MYERS, and Mr. COATS

NOVEMBER 20, 1981

Reported with an amendment and referred to the Committee on Armed Services, to the Committee on Energy and Commerce and to the Committee on Science and Technology for a period ending not later than March 1, 1982, for consideration of such portions of the bill and amendment as fall within the jurisdiction of those committees under clause 1(c), 1(h), and 1(r), rule X respectively

[Strike out all after the enacting clause and insert the part printed in italic]

A BILL

To amend the Small Business Act to strengthen the role of the small, innovative firms in federally funded research and development, and to utilize Federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the Nation's economy.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

~~SECTION 1. This Act may be cited as the "Small Business Innovation Development Act of 1981".~~

~~SEC. 2. (a) The Congress finds that—~~

~~(1) technological innovation creates jobs, increases productivity, competition, and economic growth, and is a valuable counterforce to inflation and the United States balance-of-payments deficit; and~~

~~(2) while small business is the principal source of significant innovations in the Nation, the vast majority of federally funded research and development is conducted by large businesses, universities, and Government laboratories.~~

~~(b) Therefore, the purposes of this Act are—~~

~~(1) to stimulate technological innovation;~~

~~(2) to use small businesses to meet Federal research and development needs; and~~

~~(3) to increase private sector commercialization of innovations derived from Federal research and development.~~

~~SEC. 3. Section 9(b) of the Small Business Act is amended—~~

~~(1) by striking out "and" at the end of clause (2);~~

~~(2) by striking out the period at the end of clause (3) and inserting in lieu thereof "; and"; and~~

~~(3) by adding at the end thereof the following:~~

~~"(4) to develop and maintain a source file and an information program to assure each qualified and interested small business concern the opportunity to participate in Federal agency small business innovation research programs;~~

~~"(5) to coordinate with participating agencies a schedule for release of SBIR solicitations, and to pre-~~

~~pare a master release schedule so as to maximize small businesses opportunities to respond to solicitations;~~

~~"(6) to independently survey and monitor the operation of SBIR programs within participating Federal agencies; and~~

~~"(7) to report annually to the Committee on Small Business of the Senate and the Committee on Small Business of the House of Representatives on the SBIR programs of the Federal agencies and the Administration's information and monitoring efforts related to the SBIR programs.".~~

~~SEC. 4. Section 9 of the Small Business Act is amended by adding at the end thereof the following new subsections:~~

~~"(e) For the purpose of this section—~~

~~"(1) the term 'Federal agency' means an executive agency as defined in section 105 of title 5, United States Code, or a military department as defined in section 102 of such title;~~

~~"(2) the term 'funding agreement' means any contract, grant, or cooperative agreement entered into between any Federal agency and any small business for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government;~~

~~"(3) the term 'Small Business Innovation Research program' or 'SBIR' means a program under which a portion of a Federal agency's research or research and development effort is reserved for award to small business concerns through a simplified, standardized acquisition process having a first phase for determining, insofar as possible, the technical and economic feasibility of ideas proposed under the program, and a second phase, the awarding of which shall take into consideration the potential commercial applications of the research or research and development, to further develop the proposed idea to meet the particular agency needs; and a third phase where private capital pursues commercial applications of the research or research and development; phase three may also involve follow-on production contracts with some agencies for products or processes intended for use by the United States Government; and~~

~~"(4) the term 'research' or 'research and development' means any activity which is (A) a systematic study directed toward fuller scientific knowledge of the subject studied; (B) a systematic study directed specifically toward applying new scientific knowledge to meet a recognized need; or (C) a systematic application of new scientific knowledge toward production of useful~~

~~materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements. Such term does not include studies related to the social sciences or the humanities.~~

~~"(f) Each Federal agency which has a research or research and development budget in excess of $100,000,000 for any fiscal year beginning with fiscal year 1982 shall expend not less than 1 per centum of such budget for fiscal year 1982, and not less than 2 per centum for all subsequent fiscal years with small business concerns specifically in connection with a small business innovation research program which meets the requirements of this Act and regulations issued hereunder. Funding agreements with small business concerns for research or research and development which result from competitive or single source selections other than under a small business innovation research program shall not be counted as meeting any portion of the percentage requirements of this section.~~

~~"(g) Each Federal agency required by subsection (f) to establish a small business innovation research program shall in accordance with this Act and regulations issued hereunder—~~

~~"(1) establish an agency small business innovation research program;~~

~~"(2) determine categories of projects to be in its SBIR program;~~

~~"(3) issue small business innovation research solicitations in accordance with a schedule determined cooperatively with the Small Business Administration;~~

~~"(4) receive and evaluate proposals resulting from SBIR proposals;~~

~~"(5) select awardees for its SBIR funding agreements;~~

~~"(6) administer its own SBIR funding agreements (or delegate such administration to another agency);~~

~~"(7) make payments to recipients of SBIR funding agreements on the basis of progress toward or completion of the funding agreement requirements; and~~

~~"(8) make an annual report on the SBIR program to the Small Business Administration.~~

~~"(h) In addition to the requirements of subsection (f), each Federal agency which has a budget for research or research and development in excess of $20,000,000 for any fiscal year beginning with fiscal year 1982 shall establish goals specifically for funding agreements for research or research and development to small business concerns, and no goal established under this subsection shall be less in actual dollars than the amount of research or research and development awards made to small businesses in 1981.~~

~~"(i) Each Federal agency required by this section to have an SBIR program or to establish goals shall report annually to the Small Business Administration the number of awards pursuant to grants, contracts, or cooperative agreements over $10,000 in amount and the dollar value of all such awards, identifying SBIR awards and comparing the number and amount of such awards with awards to other than small business concerns.~~

~~"(j)(1) The Administrator of the Office of Federal Procurement Policy, in conjunction with the Small Business Administration, shall promulgate and issue appropriate regulations, in accordance with the provisions of subsections (f), (g), and (h) and within one hundred and twenty days after the date of enactment of the Small Business Innovation Research Act of 1981, for conduct of small business innovation research programs within the Federal Government. Such regulations shall—~~

~~"(A) provide for simplified standardized and timely SBIR solicitations, proposals, and evaluation processes; and~~

~~"(B) require Federal agencies to coordinate SBIR solicitation release schedules with the Small Business Administration.~~

~~"(2) The National Science Foundation and the Small Business Administration shall furnish the Administrator of~~

~~the Office of Federal Procurement Policy advice and assistance in the promulgation of regulations under this section.".~~

~~SEC. 5. The amendments made by this Act do not authorize the appropriation of funds.~~

SECTION 1. This Act may be cited as the "Small Business Innovation Development Act of 1981".

SEC. 2. (a) The Congress finds that—

(1) technological innovation creates jobs, increases productivity, competition, and economic growth, and is a valuable counterforce to inflation and the United States balance-of-payments deficit;

(2) while small business is the principal source of significant innovations in the Nation, the vast majority of federally funded research and development is conducted by large businesses, universities, and Government laboratories; and

(3) small businesses are among the most cost-effective performers of research and development and are particularly capable of developing research and development results into new products.

(b) Therefore, the purposes of this Act are—

(1) to stimulate technological innovation;

(2) to use small businesses to meet Federal research and development needs; and

(3) to increase private sector commercialization innovations derived from Federal research and development.

SEC. 3. Section 9(b) of the Small Business Act is amended—

(1) by striking out "and" at the end of paragraph (2);

(2) by striking out the period at the end of paragraph (3) and inserting in lieu thereof "; and"; and

(3) by adding at the end thereof the following:

"(4) to develop and maintain a source file and an information program to assure each qualified and interested small business concern the opportunity to participate in Federal agency small business innovation research programs;

"(5) to coordinate with participating agencies a schedule for release of SBIR solicitations, and to prepare a master release schedule so as to maximize small businesses' opportunities to respond to solicitations;

"(6) to independently survey and monitor the operation of SBIR programs within participating Federal agencies; and

"(7) to report not less than annually to the Committee on Small Business of the Senate and the Committee on Small Business of the House of Representa-

tives on the SBIR programs of the Federal agencies and the Administration's information and monitoring efforts related to the SBIR programs.".

SEC. 4. Section 9 of the Small Business Act is amended by adding at the end thereof the following new subsections:

"(e) For the purpose of this section—

"(1) the term 'Federal agency' means an executive agency as defined in section 105 of title 5, United States Code, or a military department as defined in section 102 of such title;

"(2) the term 'funding agreement' means any contract, grant, or cooperative agreement entered into between any Federal agency and any small business for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government;

"(3) the term 'Small Business Innovation Research Program' or 'SBIR' means a program under which a portion of a Federal agency's research or research and development effort is reserved for award to small business concerns through a uniform process having—

"(A) a first phase for determining, insofar as possible, the scientific and technical merit and

feasibility of ideas submitted pursuant to SBIR program solicitations;

"(B) a second phase to further develop the proposed ideas to meet the particular program needs, the awarding of which shall take into consideration the scientific and technical merit and feasibility evidenced by the first phase and, where two or more proposals are evaluated as being of approximately equal scientific and technical merit and feasibility, special consideration shall be given to those proposals that have demonstrated third phase, non-Federal capital commitments; and

"(C) where appropriate, a third phase in which non-Federal capital pursues commercial applications of the research or research and development and which may also involve follow-on production contracts with a Federal agency for products or processes intended for use by the United States Government; and

"(4) the term 'research' or 'research and development' means any activity which is (A) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied; (B) a systematic study directed specifically toward applying new knowl-

edge to meet a recognized need; or (C) a systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

"(f) Each Federal agency which has a research or research and development budget in excess of $100,000,000 for fiscal year 1982, or any fiscal year thereafter, shall expend not less than 0.5 per centum of such budget in fiscal year 1982 or in such subsequent fiscal year as the agency has such budget, not less than 1 per centum of such budget in the second fiscal year thereafter, not less than 2 per centum of such budget in the third fiscal year thereafter, and not less than 3 per centum of such budget in all subsequent fiscal years with small business concerns specifically in connection with a small business innovation research program which meets the requirements of the Small Business Innovation Development Act of 1981 and regulations issued thereunder. Funding agreements with small business concerns for research or research and development which result from competitive or single source selections other than under a small business innovation research program shall not be counted as meeting any portion of the percentage requirements of this section.

"(g) Each Federal agency required by subsection (f) to establish a small business innovation research program shall, in accordance with this Act and regulations issued hereunder—

"(1) unilaterally determine categories of projects to be in its SBIR program;

"(2) issue small business innovation research solicitations in accordance with a schedule determined cooperatively with the Small Business Administration;

"(3) unilaterally receive and evaluate proposals resulting from SBIR proposals;

"(4) unilaterally select awardees for its SBIR funding agreements;

"(5) administer its own SBIR funding agreements (or delegate such administration to another agency);

"(6) make payments to recipients of SBIR funding agreements on the basis of progress toward or completion of the funding agreement requirements; and

"(7) make an annual report on the SBIR program to the Small Business Administration and the Office of Science and Technology Policy.

"(h) In addition to the requirements of subsection (f), each Federal agency which has a budget for research or research and development in excess of $20,000,000 for any

fiscal year beginning with fiscal year 1982 or subsequent fiscal year shall establish goals specifically for funding agreements for research or research and development to small business concerns, and no goal established under this subsection shall be less than the percentage of the agency's research or research and development budget expended under funding agreements with small business concerns in the immediately preceding fiscal year.

"(i) Each Federal agency required by this section to have an SBIR program or to establish goals shall report annually to the Small Business Administration the number of awards pursuant to grants, contracts, or cooperative agreements over $10,000 in amount and the dollar value of all such awards, identifying SBIR awards and comparing the number and amount of such awards with awards to other than small business concerns.

"(j) The Small Business Administration, after consultation with the Administrator of the Office of Federal Procurement Policy, the Director of the Office of Science and Technology Policy, and the Intergovernmental Affairs Division of the Office of Management and Budget, shall, within one hundred and twenty days of the enactment of the Small Business Innovation Development Act of 1981, issue policy directives for the general conduct of the SBIR programs within the Federal Government, including providing for—

"(1) simplified, standardized, and timely SBIR solicitations;

"(2) a simplified, standardized funding process which provides for (A) the timely receipt and review of proposals; (B) outside peer review for at least phase two proposals; (C) protection of proprietary information provided in proposals; (D) selection of awardees; (E) retention of rights in data generated in the performance of the contract by the small business concern; (F) transfer of title to property provided by the agency to the small business concern if such a transfer would be more cost effective than recovery of the property by the agency; (G) cost sharing; and (H) cost principles and payment schedules;

"(3) exemptions from the regulations under paragraph (2) if national security or intelligence functions clearly would be jeopardized;

"(4) minimizing regulatory burden associated with participation in the SBIR program for the small business concern which will stimulate the cost-effective conduct of Federal research and development and the likelihood of commercialization of the results of research and development conducted under the SBIR program; and

"(5) simplified, standardized, and timely annual report on the SBIR program to the Small Business Administration and the Office of Science and Technology Policy.

"(k) The Director of the Office of Science and Technology Policy, in consultation with the Federal Coordinating Council for Science, Engineering and Research, shall, in addition to such other responsibilities imposed upon him by the Small Business Innovation Development Act of 1981—

"(1) independently survey and monitor all phases of the implementation and operation of SBIR programs within agencies required to establish an SBIR program, including compliance with the expenditures of funds according to the requirements of subsection (f) of this section; and

"(2) report not less than annually, and at such other times as the Director may deem appropriate, to the Committees on Small Business of the Senate and the House of Representatives on all phases of the implementation and operation of SBIR programs within agencies required to establish an SBIR program, together with such recommendations as the Director may deem appropriate.".

APPENDIX II

STATEMENTS SUBMITTED FOR THE RECORD

WARREN B. RUDMAN
NEW HAMPSHIRE

COMMITTEES:
APPROPRIATIONS
GOVERNMENTAL AFFAIRS
SELECT COMMITTEE ON
SMALL BUSINESS

United States Senate
WASHINGTON, D.C. 20510

OFFICES:
SENATE OFFICE BUILDING
[illegible]
WASHINGTON, D.C. 20510
125 NORTH MAIN STREET
603-225-7115
CONCORD, NEW HAMPSHIRE 03301
NORRIS COTTON FEDERAL BUILDING
[illegible]
MANCHESTER, NEW HAMPSHIRE 03103
THOMAS J. MCINTYRE FEDERAL BUILDING
[illegible]
PORTSMOUTH, NEW HAMPSHIRE 03801
157 MAIN STREET
[illegible]
BERLIN, NEW HAMPSHIRE 03570

January 26, 1982

Honorable Don Fuqua
Chairman
Committee on Science
and Technology
U.S. House of Representatives
Washington, D.C.

RECEIVED
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COMMITTEE ON SCIENCE
AND TECHNOLOGY

Dear Chairman Fuqua:

I would like to take this opportunity to again thank you and the members of your Committee for the opportunity to appear before you concerning H.R.4326, the Small Business Innovation Development Act. The cordiality extended to both Senator Kennedy and myself and the depth of subject matter knowledge exhibited by all members of the Committee were greatly appreciated. Your Committee is a credit to the House of Representatives.

I would also like to take this opportunity to respond to Mr. Kirschenmann of the Department of Health and Human Services concerning the existence of small firms capable of engaging in research in the life sciences field. To that end I enclose a copy of the testimony of Richard L. Dicicco of Technology Catalysts, testimony I referred to today before your Committee. As you can see, his company maintains files on at least 2600 businesses engaged, or capable of engaging, in such research. Additionally, he states that passage of legislation such as that being considered by your Committee will create an upswing in new, small R&D firms. This is not surprising, and is already taking place as young researchers seek career opportunities in other than the academic environment. A recent report of the National Research Council, whose members are drawn from both the National Academies of Science and Engineering and the Institute of Medicine, highlighted the lack of academic career opportunities facing young researchers in science and engineering. Legislation such as that being considered by your Committee will help insure a steady flow of highly talented and motivated people into graduate education in both science and medicine. Not surprisingly, the university system has recognized this fact. For example, in Philadelphia, a consortium of 28 universities, colleges, and medical institutions formed a science center which provides a research environment for over 63 small companies, as well as other research groups and government agencies.

Honorable Don Fuqua
January 26, 1982
Page 2

I think it is clear that if Mr. Kirschenmann would take the time to do an in-depth study of the facts, he would find a considerable number of small firms capable of conducting research in his area of concern.

Again, thank you for the opportunity to carry on this dialogue with respect to a very important issue. I would very much appreciate it if you would share this letter with the other members of the Committee at some time during the next two days of hearings.

Sincerely,

Warren B. Rudman

Warren B. Rudman
United States Senator

Enclosure

WBR/lwm

Bio Med

TECHNOLOGY CATALYSTS, INC.

2323 COLUMBIA PIKE, SUITE 506
ARLINGTON, VIRGINIA 22204
703/979-1932

TESTIMONY OF
RICHARD L. DICICCO
PRESIDENT

BACKGROUND

AS BACKGROUND FOR THIS TESTIMONY, OUR COMPANY HAS BEEN OPERATING FOR THREE YEARS, IN THE BUSINESS OF MATCHING UP LARGE COMPANIES WITH SMALL HIGH-TECHNOLOGY RESEARCH FIRMS. WE HAVE OVER 350 MEDIUM TO LARGE CLIENTS WHO RETAIN US TO FIND TECHNOLOGY AVAILABLE FOR LICENSE.

WE DEVELOPED A DATA BASE OF SMALL R&D COMPANIES, WHICH WE UPDATE TWICE A YEAR. THE ONLY INFORMATION WE COLLECT IS HOW MUCH THEY ARE SPENDING IN R&D BY PROJECT. THIS SERVES AS THE BASIS OF POSSIBLE PROPRIETARY TECHNOLOGY, AND OUR JOB IS TO FIND IT. WE NOW HAVE DATA ON 9,613 SMALL HIGH TECHNOLOGY RESEARCH FIRMS IN THE UNITED STATES.

WE ARE OFTEN ASKED HOW WE FOUND THESE FIRMS TO BUILD THE DATA BASE. WE BEGAN WITH AND STILL DO COMPUTER SEARCHES OF THE FOLLOWING DATA BASES:

1. U.S. PATENTS
2. HIGH TECHNOLOGY LITERATURE OF THE MEDICAL, CHEMICAL AND RELATED FIELDS
3. FDA PINK SHEETS
4. RESEARCH IN PROGRESS
5. PAST U.S. GOVERNMENT FUNDED RESEARCH.

THEN WE CONTACTED EACH OF THE FIRMS TO DETERMINE THE LEVEL OF R&D SPENDING. THIS IS THE COMPUTER DATA IN DISK FORM OF THIS SMALL RESEARCH COMPANY DATA BASE. OUR INFORMATION IS UNPUBLISHED AND CONFIDENTIAL, AND SERVES ONLY AS ONE POSSIBLE SOURCE OF PROPRIETARY TECHNOLOGY.

NUMBER OF FIRMS

IN ANSWER TO THE QUESTION OF HOW MANY SMALL HIGH TECHNOLOGY FIRMS THERE ARE IN THE LIFE SCIENCES FIELD, OUR DATA BASE SHOWS 2,636, DIVIDED INTO THE FOLLOWING CATEGORIES:

BIOMEDICAL SMALL HIGH-TECHNOLOGY RESEARCH COMPANIES IN U.S.A.

SOURCE: TECHNOLOGY CATALYSTS, INC.

# SMALL HIGH-TECHNOLOGY FIRMS	SUBJECT AREA
144	Biomedical Engr
162	Biochemistry
168	Pure Cancer Research
164	Cell Biology
173	Genetics
206	Immunology
211	Medical Electronics and Instruments
180	Molecular Biology
157	Nutrition
295	Pharmacalogy
109	Recombinant DNA
195	Toxicology
55	Tumors
198	Virology
219	Other Categories
Total 2,636	

WE BELIEVE THAT THE NUMBER OF SMALL HIGH-TECHNOLOGY FIRMS IN GENETICS IS HIGHLY UNDERSTATED IN OUR DATA BASE. MR. STEPHEN TURNER, PRESIDENT OF BETHESDA RESEARCH LABS, STATED ONE YEAR AGO THAT THERE WERE 1,000 RESEARCH FIRMS WORKING IN CLONING[1] ALONE. USING MR. TURNER'S NUMBER, THIS BRINGS THE NUMBER OF LIFE SCIENCE HIGH-TECHNOLOGY FIRMS CLOSE TO 3,500.

WE HAVE GOOD REASON TO BELIEVE THAT $40 MILLION IN FEDERAL R&D MONEY WILL MAKE AN IMPACT ON THESE SMALL HIGH-TECHNOLOGY R&D FIRMS. A TOTAL OF 400 AWARDS OF $100,000 WILL CERTAINLY RESULT IN SEVERAL COMMERCIALIZATIONS IF WE LOOK AT HISTORY. IN OUR OWN EXPERIENCE, WE WERE RESPONSIBLE FOR EIGHTY LICENSES LAST YEAR, AND ALL BUT TWO WERE SMALL HIGH-TECHNOLOGY COMPANIES, NEARLY FORTY IN LIFE SCIENCES ALONE. A RECENT[2] ARTICLE MENTIONED ONE OF THESE SMALL R&D FIRMS, ASTRE INC. OF CHARLOTTESVILLE, VA, PROVIDING BECTON DICKINSON AND COMPANY WITH AN ENTIRELY NEW BUSINESS, THROUGH THE VEHICLE OF AN R&D RISK CAPITAL RESEARCH CONTRACT.

IF THIS LEGISLATION PASSES, THERE WILL BE AN UPSWING IN NEW SMALL R&D FIRMS IN LIFE SCIENCES, AS IT WILL APPEAR THAT THIS IS ANOTHER SOURCE OF EARLY STAGE SEED MONEY FOR HIGH RISK, HIGH-TECHNOLOGY LIFE SCIENCE BUSINESSES.

I WILL NOW ANSWER ANY QUESTIONS.

NOTES

1. "Birth of the Gene Machine", A.J. Parisi, New York Times Business and Finance, June 29, 1980, p.2.
2. "Conference Boosts Small Business Innovation", Walt Lepkowski, Chemical and Engineering News, June 15, 1981, pp. 10-11.

June 15, 1981
Volume 59, Number 24
CENEAR 59 (24) 1–48

Chemical & Engineering NEWS

Conference boosts small business innovation

Technological trade fairs are nothing new anymore. What is looked for today are new wrinkles in the buying and selling of ideas. A wrinkle that is only one year old and showing some promise is the Industrial Innovation Conference gathering this week in Chicago. This one is the third such conference over the past year. It is sponsored by the American Association of Small Research Companies (AASRC), and its aim is to get big companies to buy scientific and technological know-how from small companies.

This week's conference, at the O'Hare Ramada in Chicago, has 10 corporate sponsors who each paid $2000 to cover expenses. They are Sun Oil, Chevron, Arco, Monsanto, Rohm & Haas, Diamond Shamrock, Eastman Kodak, Control Data, Procter & Gamble, and Gillette.

About 200 small research companies are expected to show their wares this week. If they are members of AASRC they will be charged $100, nonmembers must pay $150. For nonsponsoring big companies, the fee is $500.

One small research company that found some payoff in attending last year's conference in Baltimore was Astre Corp., Charlottesville, Va. Astre, with 50 professionals, is one of the larger small companies and does contract-only work in fermentation, pollution control, and other areas of the chemical and biochemical technologies.

Its president, Roy A. Ackerman, says attendance at the conference led to two lucrative contracts with NL Industries, and the hospital equipment manufacturer, Becton Dickinson & Co. Ackerman isn't saying anything about the Becton deal besides saying it involves a medical device. The NL contract called for developing a microbial process for disposing of ferrous sulfide wastes from its titanium dioxide manufacturing process.

The AASRC meeting is the nearest thing to a technological encounter group going. It is designed expressly for interaction among buyers, sellers, and brokers of technology. In the case of Astre, NL, and Becton, a third party—the broker—played the contact role in getting the couples together. In this case, the broker was Richard DiCicco, president of Technology Catalysts of Arlington, Va.

DiCicco and his staff are in the business of alerting companies to technologies being developed and offered for licensing by other companies. Becton and NL are clients of DiCicco and thus he knew about the technologies they were seeking. Knowing also what Astre had to offer, he effected the marriage between them.

The meeting is the brainchild of Sam Cardon, president of AASRC. Its aim is to bring people together, give them time to make their presentation, and then allow lots of time for private conversation. The registration fee covers meals, hospitality hours, cocktails, and various other breaks.

"Most of the other meetings," says DiCicco, "are just trade shows. There isn't much contact in an area where the name of the game is contact." Adds Ackerman: "Small companies—though not so much us—have almost no marketing skills and often don't speak the language of business. At this meeting, the big companies understand that and are attuned to it. This meeting helps people establish the contacts they need."

"We are a cosponsor of the conference," says Terry Winters, Diamond Shamrock's manager for new technologies and licensing. "The reason we do it is that we are interested in identifying new and emerging technologies worldwide. We need this kind of thing because a lot of research is going on in the U.S. and these small research company guys need a vehicle to commercialize it. The big companies are that vehicle. Each big company has a different orientation and different interests. So one way to make your interests known is to meet the people and get a dialogue between them.

"To the best of our knowledge, it is a unique conference. There are any number of technology transfer fairs around the world. But there isn't anything so specific as big companies getting together with the small research companies. There's lots of time for individual get-togethers. If you're looking for proprietary opportunities, these come by personal contacts."

Cardon has worked tirelessly to come up with a better way of getting small companies and big companies together. He says the idea of a new kind of conference sprang from his frustrations with meetings the Commerce Department and Small Business Administration would organize. The results usually were wasted motion with no one saying anything a potential customer wanted to hear.

Cardon already is a partner in a small research company, General Technical Services, Upper Darby, Pa. "The big thing about these conferences," he says, "is that they give a guy like me a chance to get together with guys from other companies. That's a key thing. I'm finding that more and more companies are moving out and aren't afraid to talk about the kind of technologies they are looking for. Up to recently, the problem was that the small companies and big companies thought they were in competition. But now we're finding they can both help each other.

"Everyone was playing their cards close to their vests during our first meeting last year in Baltimore," recalls Cardon. "But once things got going, we found everyone was willing to talk." Now, with small sessions during which big companies talk about what they are after and small companies talk about what they offer combined with workshops, cocktails, and other breaks, the ice may be broken permanently.

"Some things are at least coming to light," he says. "The large companies don't like to buy basic research or beginning applied research. They like a prototype. That's why the small company at the start must get government contracts to develop that prototype. Then after you have developed a product or process, protected by patents, you can go to large companies."

Cardon says he thinks it would help if cooperative programs were set up between small businesses and universities. But the universities will have to keep in mind that most small companies need support even more than the universities do. He says such ventures would pay off for academia in the long run, "because a viable small high-technology community of companies could make it easier to commercialize the university research developments."

Wil Lepkowski, Washington

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January 27, 1982

Honorable Don Fuqua
Chairman
Committee on Science & Technology
U.S. House of Representatives
Washington, D. C. 20515

Dear Don:

I am submitting the enclosed statement in behalf of H.R. 4326, the Small Business Innovation Development Act. I regret that my schedule makes it impossible for me to appear personally at your Committee hearings.

I am pleased that you are giving thorough and careful consideration to H.R. 4326, and that you have included a number of witnesses from the small high technology business community. I trust that our joint efforts will result in strong and highly beneficial legislation.

I sincerely appreciate the opportunity which you have extended to me to include my testimony for the hearing record.

Best wishes,

Parren
Parren J. Mitchell
Chairman

PJM:lff

Enclosure

Testimony of HONORABLE PARREN J. MITCHELL
Chairman, House Committee on Small Business
before the
House Committee on Science and Technology

Mr. Chairman, I appreciate this opportunity to present my written testimony on behalf of H.R. 4326, the Small Business Innovation Development Act, and to express my concern and the concern of the entire Small Business Committee membership about the underutilization of small business in Federal research and development efforts. We have been studying this problem for the past several years because of the significant role which small businesses play in the innovation process. As you are undoubtedly aware, an alarm has been sounded about declining industrial innovation and productivity in the United States. Our Committee, and other concerned Members of Congress, have been working for many months on measures to stimulate the economy and to improve the climate for innovation and productivity increases.

In an effort to find solutions and to test the efficacy of this legislation, we turned to the experts. A number of studies have been made, both independent and government sponsored, which recommend increased involvement of small firms in Federal R&D as a means of fostering technological progress. We have studied the problem long enough. I strongly feel that it is time to take action.

In 1978, when the House and Senate Small Business Committees conducted joint hearings on the subject of small business and innovation, small firms were receiving approximately 4% of Federal R&D awards. In 1981 that figure had remained virtually unchanged in spite of promises by agency officials that they would do better. Indeed, some agencies have improved their small business involvement, but the overall result is still the same. And unless

Congress acts, we can assume that the agencies will continue to do business as usual.

Budgetary considerations demand that we exercise caution and initiate programs which are fully justified by their potential returns to the economy. H.R. 4326 can have that effect in providing new jobs and new products while exerting a downward pressure on inflation.

Two GAO studies have confirmed our confidence in H.R. 4326. The first, dated July 7, 1981, reviewed what was known about small business and innovation to determine criteria to assess innovation initiatives. The Small Business Innovation Research program (SBIR) at the National Science Foundation was assessed by GAO as meeting those criteria necessary to support small businesses as innovators. In other words, if the goal is to stimulate innovation in the small business sector, the SBIR program, according to GAO, was effective in doing the job. H.R. 4326 would extend the SBIR program to other Federal agencies.

In July of 1981 I sent a letter to GAO asking for a comprehensive summary and assessment of the existing studies about invention and the sources of innovation. The purpose of my request was to verify conclusions which have been drawn from those studies about small business and the innovation process and which became the basis for this legislation. Nine studies were analyzed. I have the result of that analysis before me at this time and I am happy to report that previous claims seem to be substantiated, with one additional conclusion which is especially significant. In spite of some measurement and methodological problems in the studies analyzed, GAO agreed that certain broad generalizations can be drawn about small businesses: They have the ability to innovate more efficiently, and their contributions have been and are extremely significant. Moreover, GAO concluded that smaller businesses, including individual researchers, have the flexibility and initiative considered more conducive to invention than the large laboratories.

The bottom line of this GAO report seems to be that the most important contribution of the small firm may be in the invention stage of the innovation process. Invention is several times more likely in the small firm or the result of individuals working on their own behalf than in large research labs. This finding supports the concept provided in H.R. 4326 because the SBIR program offers an incentive for the involvement of smaller research firms in the invention phase of the innovation process, precisely where the need and potential returns are greatest.

The following is quoted from one of the studies analyzed in the GAO report:

> The activities of small firms and individual inventors can no longer be neglected and ignored in our efforts to foster technological innovation and progress. Ways must be found to support these sources whereas past policies have in effect promoted the institutionalization of invention in large industrial laboratories which receive all the accolades and most of the support . . . although . . . the bulk of major inventions originate outside those laboratories, particularly in the work of independent inventors and small and medium size firms; these sources have been relatively neglected and their potential contributions virtually ignored--at least in our formal policies. It seems clear that future efforts to foster technological progress must cease this neglect and develop ways of supporting these wellsprings of fundamental advances in the arts. (emphasis added)

I certainly do not wish to deny the importance of the large non-profit, university, medical college, foundation, or corporation laboratory in our national research. But we have neglected for too long, and to our detriment, the possibilities of the smaller laboratory and the individual researcher in all types of government-sponsored R&D. If we can believe these studies, and they certainly cannot be ignored, additional efforts must be made to stimulate small laboratory activity in technological and life-science research efforts.

University and larger laboratories have been receiving approximately 96% of Federal R&D. The amounts proposed by H.R. 4326 are miniscule by comparison. I sincerely hope the distinguished Members of this Committee will give their fullest consideration to this bill which effectively targets resources in the precise manner recommended by the experts. Our Committee is indebted to the Committee on Science and Technology for your series of seven excellent hearings which you held on Small Business and Innovation in 1979 and 1980. I have examined the conclusions and recommendations of those hearings and believe that H.R. 4326 faithfully addresses and responds to those findings.

In conclusion, I want to state that I agree wholeheartedly with a conclusion in a Department of Commerce report included in the GAO analysis, that it is not simply that more money should be spent on R&D, but that incentives should be aimed at encouraging the independent inventor-entrepreneur and small technologically based businesses. H.R. 4326 does precisely that. The cost of these incentives is low, and the benefits likely to be high.

P. O. Box 389
Grant, NE 69140
January 6, 1982

RECEIVED

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COMMITTEE ON SCIENCE
AND TECHNOLOGY

Honorable Don Fuqua
Committee On Science And Technology
U. S. House of Representatives
Suite 2321 Rayburn House Office Building
Washington, D.C. 20515

Dear Congressman Fuqua:

Thank you for responding to my letter and testimony concerning the proposed SBIR legislation and the issues affecting it. You certainly have my permission to use the materials at hearings as I would be most pleased if they can help in the generation of a complete and realistic perspective on the problems as well as the opportunities that implementation of the legislation would foster.

I also appreciated receiving the copy of your testimony on the legislation along with your letter. It acquainted me more fully with your concerns on the issues. Since I have your ear I would like to take the liberty of commenting further on those concerns as well as others I have recently heard and ask that my comments be considered in deliberations on the legislation. If you would submit the remarks below in any new hearing records I will appreciate it.

I can agree completely with you that the federal R&D budgets are already severely constrained and further that the SBIR set aside will definitely cause some impact on the agencies required to participate. That is precisely why the SBIR legislation should be passed. The issue should not be whether the budgets are severely constrained--they are. The question is how do we get productivity out of the government R&D dollar. Because the budgets are constrained it is even more important to get maximum productivity. Without question, the evidence is overwhelming that individuals and small businesses are extremely productive in developing basic science concepts, new technologies and new products. The SBIR program would simply allocate some of the current and ongoing money to that potentially most productive sector of the scientific and industrial community. The legislation is not, as some contend, designed to benefit the small business sector of our economy. It very simply recognizes that some of the government R&D money needs to be allocated to the most productive sector. In that light the legislation must be percieved as being nothing more than Congress conducting good business with the taxpayers money for the benefit of the country and science as a whole. I firmly believe that Congress and science community will find the legislation so productive that it will force a lot of rethinking on how our goverments R&D has been and should be allocated. This small step in opening some R&D money to competition is bound to have far reaching beneficial effects. You will agree I am sure there is room for an increase in R&D productivity and that there is more than one approach to any R&D problem. The evidence is abundantly clear that we need to see what a change in a small portion of the budget allocation cam accomplish. The SBIR legislation would accomplish that. It will bring individuals into the mainstream of science that currently do not have the financial resources required to pursue ideas actively. The history of science demonstrates very adequately the impact individuals can have on basic science as well as product development if they are afforded the opportunity to participate.

Concerning basic science and money allocation policies by the agencies, the Schmitt ammendment to S-881 is something called for in testimony and was a necessary and constructive addition to the legislation. It should be incorporated in the House sponsored legislation as it lays to rest the argument that funds will be allocated disproportionately by agencies so as to cause basic research to suffer. Actually the legislation will open some of the current basic research money to comptetition and that will most certainly be beneficial to the health of science. I would add that the opening of funds to competition as well as a real lack of understanding about research and development within any framework other than a large institute or corporation is, I believe, the real reason for the complaints on the legislation contending that basic research support will be eroded by the SBIR program. In considering the complaints based on the basic research argument it is important to recognize they are coming from the agencies, the large research institutes on either coast and the AAU lobby. Because of this I have taken the trouble to check with researchers and administrators at several major universities concerning their views on the effects of such legislation and have found they concur with the views expressed in my testimony on the matter. They perceive the legislation as being beneficial to their basic research and graduate education functions. Aside from funding the essential features of the legislation in their opinions are that the missions to be accomplished be kept under the control of the agencies and not dictated by Congress and an ammendment as per the Schmitt ammendment on S-881 be a part of the legislation. It appears the complaints then are based on the agencies not wanting to deal with the increased numbers of people and the institutes which now command large blocks of money and cozy relationships with the agencies do not want competition from the science community in general for the same total dollars. It is also possible they really believe good basic research can only be conducted within the large laboratories and that pure and applied science can still be productively separated in todays world of advanced technology. Whatever the basis for their complaints, they are ill founded. The normal university and scientists such as myself where much of the nations science talent resides, although it is scattered around and not concentrated in a major institute, would welcome the legislation. Many if not most universities that are AAU members have not in fact been polled by the AAU concerning their viewpoints. The AAU is speaking I suspect on the basis of the contacts the major institutes keep with the AAU staff in Washington and on a teleological basis. The wheel that squeaks gets greased and the AAU is probably regurgitating what they have heard so often they actually believe it. They are representing those who make a habit of camping on their doorstep rather than polling and representing their membership at large.

On reinforcing the need for the SBIR legislation I am enclosing a statement by Erwin Frand. Please excuse the marks I made on it as I read it. Frand details in a very concise manner the underlying reasons this legislation is needed and will be productive. His comments are very appropriate even though they were not geared towards this legislation. They are actually a nice summary of the testimony you and others have gathered on the subject of entrepreneurs, innovation and the basic reasons small businesses and individuals are so uniquely efficient at developing basic science concepts, new products and new technologies.

Regarding concerns about the social sciences not being included in the bill, I agree with you that they should be covered. As I read the research definition and interpret the current bill the Social Sciences are included. The only exclusions are on the basis of budget. If the Social Sciences are excluded then it is because they have not had qualifying levels of support in the past and do not anticipate such in the future. I personally know very little about the support historically for the Social Sciences but if they have not received support levels that would qualify them that is not a problem that should be a millstone hanging around the neck of an SBIR program now. As I understand the legislation they would automatically be included when their support reached qualifying budget levels. Further, I presume that support for Social Sciences is already occurring in some of the agencies budgets covered by the bill so realistically if the Social Sciences are not involved in the SBIR program it will be because the agencies make that choice. I would suggest the Social Science problem must be addressed head on just as Congress is now addressing the matter of technological innovation. Technological innovation is receiving attention from Congress plainly and simply because it is directly related to the health of the United States economy and that is something people understand more quickly than the intracacies of Social Science involvement in the economy. You in Congress have done a thorough job of digging into the role of small business and individuals in technological innovation and have fashioned the SBIR legislation as an approach to attacking the problem. Congress should not allow a productive effort on technological innovation to languish while trying to be all encompassing in fashioning a piece of legislation which takes care of all of sciences ills. Especially when the SBIR program has such a large potential to stimulate basic

Congressman Don Fuqua
January 6, 1982
Page 3.

research simply because of the inherent structure of the program. The Social Sciences are important to the overall health of our country as is technological innovation. Your hearings have opened the door to recongnizing the human factor and the potential utility of the Social Sciences in understanding that factor in the innovation process. Hopefully your hearings and studies as they proceed will be as productive as those which have been the basis for fashioning the SBIR legislation. In the case of SBIR and technological innovation per se some of the limiting factors have been positively identified and the SBIR legislation specifically addresses those facts. The Social Sciences can be a tool for further understanding but should not be thrown up as an obstacle to the SBIR legislation. I hope you can address that distinction in the hearings you are planning to hold and thus clear that obstacle to moving forward on the SBIR legislation.

Finally I would again urge you and your colleagues to carefully consider the evidence showing that basic research and applied science should not be artificially separated. Separation when practiced is achieved arbitrarily and is a major disservice to both technological innovation and basic science. Curiosity, imangination and the desire to develop a product when combined with disciplined analysis, the scientific method and competence in development and application of basic knowledge will be a tremendous stimulus to technological innovation, product development and basic knowledge development. The SBIR format is ideally structured to facititate the above. I firmly believe that the SBIR legislation would be a large step forward in facilitating the participation of many productive scientists and innovators.

The problem areas that have been broached by detractors of the legislation can be characterized as 1) paper tiger arguments used to support self interest and those arguments fall apart upon reasonable analysis or 2) problems which can be handled by the dictates of the legislation and the oversight and promulgation mechanisms and regulations that are used to implement the legislation. The legislation should not be held up because of those arguments. Consequently I hope you will use your best efforts to further the SBIR legislation and an effective program for carrying it out.

Thank you for taking the time to consider my remarks.

Respectfully,

John Eastin

John Eastin

Enclosure

ERWIN FRAND'S THOUGHTS ON PRODUCT DEVELOPMENT

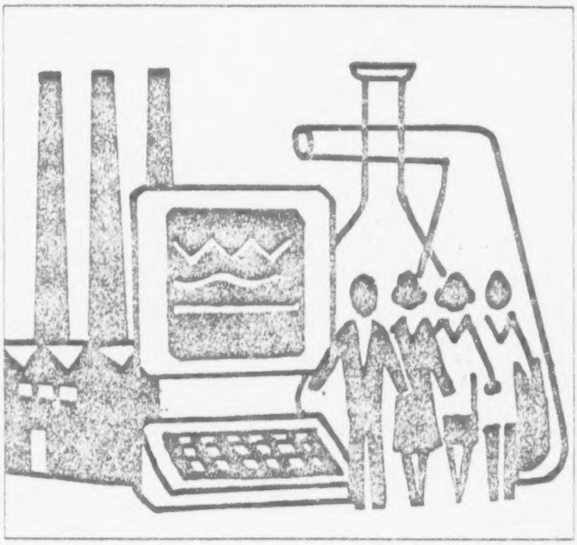
It's our own fault

WHENEVER I TAKE what I read in the business press and project it 20 or 25 years into the future, I get the distinct impression that there will only be a few activities taking place in this country. We will be a nation of three to four million farmers, and the rest of us will be selling insurance, communicating, and doing things for each other.

What leads me to that conclusion? I believe we will always have farmers for two reasons. The first is that we all must eat, and there is a worldwide demand for U.S. agricultural products. Secondly, farming is, by and large, still a business belonging to an individual, and those individuals still believe in producing a product, regardless of the profitability and the hardships involved in doing so.

What about the rest of us? It appears that as traditional American industries become ever more mature, the leaders of these businesses look around for means and methods to improve and to maintain profits. They feel that the long term trend is away from manufacturing and more toward services. **Most of them, then, feel that the businesses they should be in are the service businesses such as insurance, radio, television, and communication.**

Whereas it may very well be that for the next few years these industries can generate growth and profit returns greater than a mature manufacturing business, there is still an underlying problem. Sooner or later, the economic well being of a country and an economy depends on people making things and selling them at a profit to others. A country and an economy really make money when they can produce an excess of products and sell them abroad to other countries. **I believe that if this country ever stops being a producer of goods and becomes just a supplier of services, we will be in for some serious long-term economic hardship a quarter of a century down the road.**



The problem stems from a difference in outlook between an entrepreneur, be he a farmer or a businessman, and the leader of a large corporation. An entrepreneur believes that there is a demand for a certain product which he intuitively feels he can make and sell. In the process of making and selling his product, he also believes he can make some money. First is making the product; second is making money.

An entrepreneur knows that if he is successful in establishing his business, he will have a life-long occupation. Furthermore, it is quite probable that he will have a business which he can pass on to his children, and they can have a guaranteed life-long occupation, if things go well. Thus, **their view tends to be for the long term, rather than the short term.**

Large corporations, on the other hand, being publicly held and, to a great extent, influenced by the financial markets, look at things somewhat differently. They are under tremendous pressure to increase this year's profits over last year's, and this quarter's profits over the period a year ago. In other words, they look at things the opposite way. **The most important thing is to make money; the second is to make a product.**

Since there is no commitment to a given product or business, any business that can yield a profit becomes fair game. Thus, services, communications, insurance, etc., are today's answer to short-term profit problems. Rather than take their existing profits and assets and invest them in new products for which there can be a demand, these precious funds are used to buy businesses to maintain profits. **Since money is not being put into new products, the chances of products being developed become slim indeed.**

In essence, we, ourselves, through our major corporations, are allowing foreign competitors to take over markets and businesses which made this country the technological leader of the world at one time.

Erwin A. Frand

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1913 I Street, N.W.
Washington, D.C. 20006
Telephone: Code 202, 833-9680

5 January 1982

The Honorable Don Fuqua
Chairman, Committee on Science and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Fuqua:

The Public and Scientific Affairs Board (PSAB) of the American Society for Microbiology (ASM) wishes to submit the following remarks for the record concerning the Small Business Innovation Development Act of 1981 (HR 4326). This bill, together with Senate bill S 881, has been under study by this Board, and we wish to communicate our fear that both bills would be harmful to the basic biomedical research effort in this country.

The American Society for Microbiology has an active membership of over 31,000 individuals and is the largest single life science organization in the world. We wish to stress at the outset that ASM represents member microbiologists, whether they are holding research positions in large industry, small businesses, research institutes, or universities. We recognize that competition and free enterprise are cornerstones of our economy, and we feel that these concepts should extend to the awarding of research grants and contracts by federal agencies. Microbiologists working in small businesses should have equal opportunity to compete for research grants and contracts with their counterparts in universities, etc. Our understanding is that such is now possible with respect to National Institutes of Health (NIH) grants and contracts. However, mandating that research be set aside for any one class of organization, whether it be small businesses or universities, would constitute these awards being made on other than an impartial basis of merit, and we would oppose such a system.

The international recognition of the extramural NIH research program has resulted largely from their peer review system, which strives to assure that awards are made only on the basis of merit. This also assures that the public dollar is spent where it has the best chance of success. HR 4326 mandates a set-aside for small business firms and lacks provision for adequate peer review equivalent to that existing currently for research grants.

About 70 percent of microbiologists and other biomedical scientists in non-profit institutions, who have their applications for NIH research grants approved on the basis of scientific merit, are not funded because of insufficient money. Legislation that would mandate a set-aside of 3 percent of the NIH budget for research grants to only those scientists in small businesses is blatantly unfair. Legislation which also gives these favored few the additional advantage of not having to compete for funds in the same peer review system is bad legislation and we cannot support it.

We are sympathetic to the notion of incentives for small businesses, but the incentive in this instance is to the detriment of basic research. These are difficult times for basic research in the biomedical sciences, and the amount of the set-aside is significant. Basic research generates new ideas, concepts and products which industry and business can exploit for the public good. To legislate for a set-aside which will adversely affect basic research makes no sense at this time. We do not feel that significant numbers of basic research scientists, in contrast to applied research and development scientists, are in small businesses. Thus funds will be diverted from basic research to development or not spent at all.

We could suggest amendments which would tend to mollify the adverse effect of this bill. In our opinion, the amendments made to the Senate bill are inconsequential. We could suggest that 3 percent is too high, and that the base should be only the extramural research funds rather than the total agency budget. We could suggest that current set-asides be included and that set-aside funds not expended be available for those applicant organizations that compete on a free and non-favored basis through an accepted peer review process. Such amendments would lessen the blow, but we must reaffirm that we would still oppose legislation which would detract from basic research. We do not feel the country can afford this, and we basically oppose legislation favoring one class of scientists while discriminating against another.

The Public and Scientific Affairs Board of the ASM welcomes the opportunity to make its thoughts known to you, and we stand ready to work with you in any way we can be helpful.

Sincerely yours,

Frederick C. Neidhardt, Ph.D.
President, ASM

Harlyn O. Halvorson

Harlyn O. Halvorson, Ph.D.
Chairman, Public and Scientific Affairs Board

C. D. Cox, Ph.D.
Chairman, Committee on Medical Microbiology and Immunology

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE DEPARTMENT
STATE HOUSE • BOSTON 02133

THOMAS P. O'NEILL III
LIEUTENANT GOVERNOR

TESTIMONY BY LT. GOVERNOR THOMAS P. O'NEILL, III
FOR HEARINGS OF THE U.S. HOUSE OF REPRESENTATIVES
COMMITTEES ON SMALL BUSINESS; SCIENCE AND TECHNOLOGY
REGARDING
THE SMALL BUSINESS INNOVATION RESEARCH ACT OF 1981
H.R. 4326

Thank you for this opportunity to share with you my ideas and observations concerning the Small Business Innovation Research Act of 1981, a piece of legislation I believe to be one of the most important proposals for strengthening our economy to come before this Congress.

The innovative brilliance of smaller firms has been widely documented. Almost half of all major U.S. innovations between 1953 and 1973 were produced by small businesses. For every research and development dollar, small companies produce four times as many inventions than medium-sized firms, and twenty-four times more than large companies. The entrepreneurial spirit and competitive drive of our small business sector has consistently generated more innovative brilliance than larger, established firms. Vital products like Penicillin, the jet engine, and the zipper were all originated by small companies or individual inventors.

In light of these facts, it is not surprising that a proposal to improve federal support for small business research was voted the sixth most important recommendation of the 1980 White House Conference on Small Business.

My own state of Massachusetts is a prime example of the importance of small innovative firms in stimulating economic development. Since the dark days of the 1974-75 recession, the tremendous 32% growth in the high-technology sector has contributed to the expansion of the state economy, and kept unemployment levels below the national average. Most business start-ups are by small high-technology firms. And many of the leading companies in the field, such as Wang, Digital, and Data General, began as small risky ventures.

The experience of Massachusetts provides convincing evidence of the potential for economic growth led by innovative small businesses. Yet the continuation of this success story cannot be taken for granted. Private venture capital is often not available for the small firms willing to take the risks needed to develop potentially significant technologies.

In Massachusetts, we have attempted to fill this void in capital formation by providing support and investments to help small innovative businesses get off the ground. The Massachusetts Technology Development Corporation, which I helped to establish, provides capital and management assistance to launch and support new firms showing innovative potential. An example of the type of company MTDC has helped is the Spire Corporation, which has developed a pulse electron team annealing technology which will facilitate the production of photovoltaic solar cells. Massachusetts and other states are doing all they can to assist young, technology-based small companies.

But state programs alone cannot develop the tremendous potential of small innovative firms. Only the Federal Government, which funds half of all research and development in the United States, can make a decisive contribution to promoting innovative brilliance. The program offered by the Small Business Innovation and Research Act would guarantee that small innovative firms receive their fair share of federal research and development dollars. Smaller firms generate 50% of our gross national product, but presently receive less than 4% of federal research and development funds. By reallocating federal research and development appropriations so that agencies are required to set aside a percentage for small business, this program will harness this country's tremendous scientific and technical energies for business purposes. And this will be done at no additional cost to the taxpayer. Small business would not receive a handout or a bailout, but the initial funding which would attract private investment and expand commercial activity. I can think of few programs which better exemplify the type of cooperation between public and private sectors that is crucial for our national economic recovery and growth.

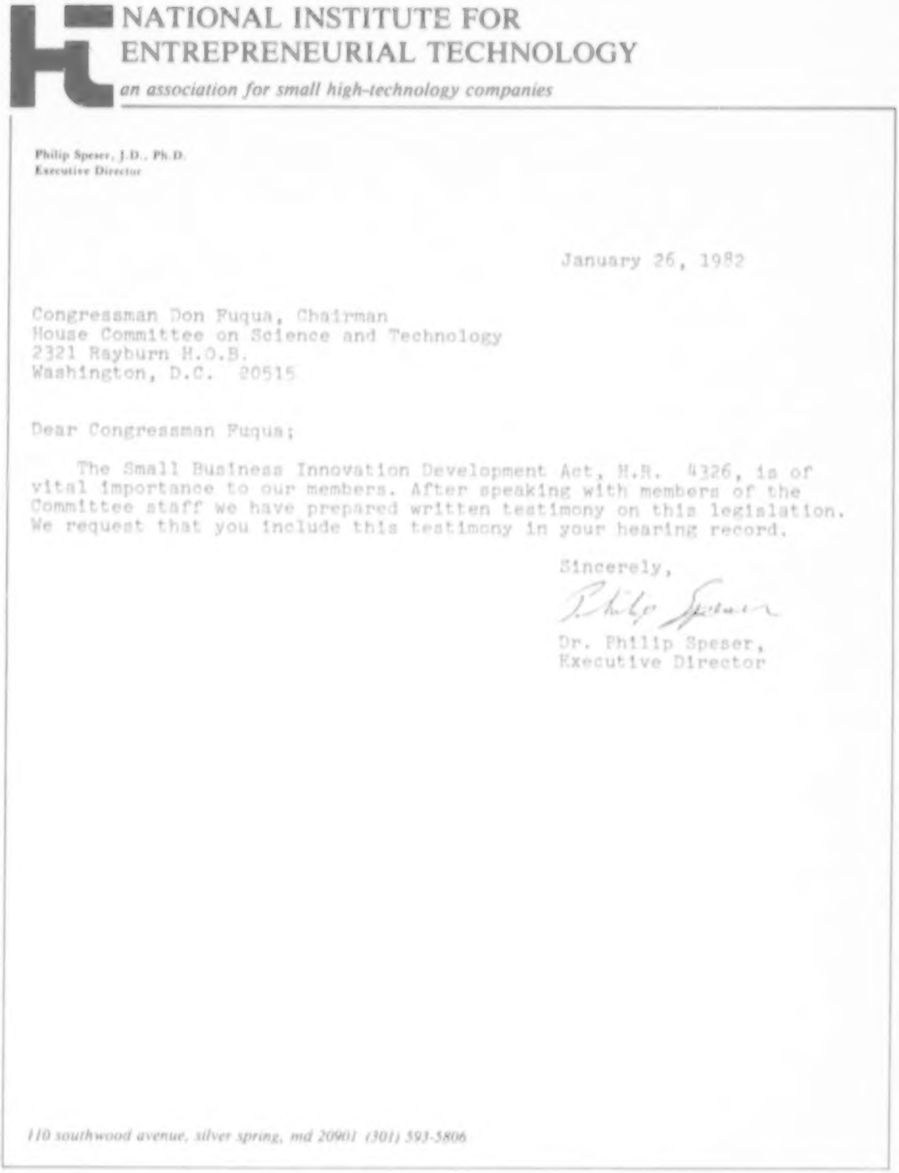
The success of this approach has already been demonstrated by the National Science Foundation's small business set-aside program. This program, designed with the help of small businessmen with experience in technological development, has shown how small innovative firms can use initial federal support to produce innovation, generate jobs, and attract private capital. Several firms in Massachusetts have been among those benefiting from the program.

As an elected official of a state noted for both its small innovative firms and large academic and medical institutions, I can say that setting aside funds for small business will ensure a more appropriate balance in American research and development activities. We need to guarantee that small firms are no longer at a disadvantage in seeking federal research support. Our leading universities and institutes consistently win the lion's share of Nobel prizes, but our civilian applied research lags behind other countries'. Japan devotes 93% of its government research funds to civilian applied research, but the United States spends only 36% on non-defense and non-space research. As a result, 38% of patents issued by the U.S. Patent and Trademark Office in 1979 went to foreign applicants, compared to only 22% in 1964. Unless we devote more funds to small business -- the most innovative sector of our economy -- we risk losing our technological advantage to the Japanese and West Germans.

The experience of my state also demonstrates that the parallel efforts of academic researchers and small innovative firms can create a favorable climate for technological innovation and economic growth. An expansion of small business innovation often benefits neighboring universities. Private firms tend to use university facilities and personnel on a contract basis. And, in Massachusetts, both Harvard and MIT have recognized the economic benefits of small business research by investing a portion of their endowments in small high-technology firms.

The Small Business Innovation and Research Act will promote private sector innovation which will eventually overcome our declining industrial productivity and help to control inflation. As David Birch's well-known study concluded, small firms are the most prolific producers of new jobs, technological innovation, and an expanded tax base. The innovative technologies produced by small firms also offer hope for conserving or locating new sources of energy, thus reducing our excessive dependence on unreliable and unstable foreign suppliers. Small business innovations will also restore our competetive edge in world markets. In Massachusetts, high-technology firms export 34% of their output and generate technologies often envied by the Japanese. The small business assisted by this program will become the growth industries of the 1980's and 1990's.

I firmly believe that the Small Business Innovation Act represents the direction our economic policy should take in the coming years. I heartily endorse it and stand ready to help you in any way.



NATIONAL INSTITUTE FOR
ENTREPRENEURIAL TECHNOLOGY
an association for small high-technology companies

Philip Speser, J.D., Ph.D.
Executive Director

January 26, 1982

Congressman Don Fuqua, Chairman
House Committee on Science and Technology
2321 Rayburn H.O.B.
Washington, D.C. 20515

Dear Congressman Fuqua;

The Small Business Innovation Development Act, H.R. 4326, is of vital importance to our members. After speaking with members of the Committee staff we have prepared written testimony on this legislation. We request that you include this testimony in your hearing record.

Sincerely,

Philip Speser

Dr. Philip Speser,
Executive Director

110 southwood avenue, silver spring, md 20901 (301) 593-5806

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an association for small high-technology companies

Philip Speser, J.D., Ph.D.
Executive Director

January 28, 1982

Testimony of Dr. Philip Speser, Executive Director,
National Institute for Entrepreneurial Technology
on the Small Business Innovation Development Act

The problems faced by our economy are familiar: unemployment, sagging productivity, inflation, inefficient use of Federal funds and large deficits, and a lack of competitiveness on world markets. While scientific research is never completely definitive on any policy issue, there is a growing body of literature which strongly suggests that small science and technology based firms make major contributions towards solving these problems. This literature relates these contributions to the vital role such companies play in our national science and technology system.

Despite the significance of small science and technology based companies, and despite repeated Congressional recommendations that Federal agencies fund more research and development (R&D) at these companies, the Federal government continues to spend only around 3.5% of its total R&D budget at small firms.

The Small Business Innovation Development Act, H.R. 4326, will establish a long-needed mechanism through which the Federal agencies can tap the resources of small innovative firms in a particularly effective manner. Modelled on the National Science Foundation's (NSF) highly successful Small Business Innovation Research (SBIR) Program, this Act will enable the Federal government to more efficiently pursue its R&D objectives and will attract private capital to commercialize the results of Federally-funded R&D. The NSF's experience indicates that SBIR programs have significant benefits for economic development, scientists, universities, large firms, and investors as well as participating small companies and agencies. The Senate has already passed its version of the legislation by a vote of 90 to 0.

I. The importance of conducting Federally-funded R&D at small companies

In describing the key to New England's economic resurgence, Lynn E. Brown, Assistant Vice President and Economist of the Federal Reserve Bank of Boston, and John S. Hekman, Professor of Economics at Boston College, state: "Many of the products produced in the region today did not exist twenty years ago, and of these a large proportion were developed by smaller firms, whether as a result of university research, government projects, or subcontracts from larger firms. The reindustrialization of New England has come about not through reinvestment by existing industries but by their replacement with new ones. It is well to keep this in mind when formulating economic development strategies. So often such strategies tend to pay the most attention to large established businesses." (Italics in text)

The contributions of small high-technology companies to economic growth are well documented in the records of the Senate and House Small Business Committees hearings on this legislation. Small high-technology firms have one of the fastest rates of growth in net new employment, productivity, sales, exports, net revenues, and tax dollars in our economy.

What is often less well known are the contributions that small high-technology firms make to R&D and innovation. Summarizing their review of the scientific studies concerning the relation between firm size and the efficiency of R&D, Kamien and Schwartz write: "Studies have consistently found actual R&D to be done more efficiently in small or medium size firms than in large firms; it has been estimated that any given project would cost three to ten times as much to develop by a large firm as by a small one. Beyond a certain not very large size, increasing firm size tends to be accompanied by a reduction in patented output per R&D dollar, a reduction in the proportion of patented inventions that are commercially employed, and a decline in the number of significant inventions per R&D dollar." A NSF survey of major innovations introduced to market between 1953 and

1973 found that small firms produced 24 times as many major innovations as large firms and 4 times as many as medium-size firms.

Although concentrating Federally-funded industrial R&D at large firms reduces the efficiency of these expenditures, a recent NSF study noted that in 1979, 20 companies received 71% of all Federal R&D funds contracted to industry. Like other bureaucrats, officials in Federal R&D agencies have strong incentives which discourage them from changing their funding habits. For example, it is far easier -- even if less efficient at times -- to administer one large funding agreement than to administer a number of smaller agreements. If an R&D project fails, and many will since it is the nature of R&D to be risky, few will blame the program manager who funds work only at "established" entities. Furthermore, large firms maintain extensive Washington government relations and marketing staffs. Major universities have special administrative units to coordinate and facilitate faculty efforts to secure R&D awards. Many universities also maintain Washington offices and work through their associations to gain the government relations and marketing advantages enjoyed by large firms. The costs of these operations at large established entities can be spread across a large number of projects.

Unable to afford special units and Washington staffs common among larger entities, small firms face a number of problems in obtaining Federal R&D awards. A 1976 report, Small Business and Federal R&D, from the Office of Management and Budget's Office of Federal Procurement Policy noted that small firms faced impediments in the areas of: stability and efficiency of R&D funding, administrative requirements, nature and timing of Requests for Proposals, the treatment of proposals, and contact with technical personnel. The report emphasized that these impediments prevent the Federal government from taking advantage of the below average R&D costs and "striking record of innovation" that small firms had demonstrated in the private sector. It recommended a variety of measures, including quotas for small firm participation in R&D procurement.

As is the case when stimulating economic development, it is important to keep in mind the track record of innovative small firms when stimulating scientific and technological progress. Too often agency strategies have focused on targeting funding at universities and large businesses.

The consequences of this failure to implement a balanced R&D funding strategy have left our country with unnecessarily long lead-times between the conceptualization of new scientific ideas and their commercialization and with a restricted pool of radically new technologies for governments and industries to use when meeting the challenges of an uncertain future. While nonmission basic research conducted at universities and other nonprofit entities provides new scientific concepts, these concepts require futher research before they can be refined into a suitable basis for technologies. The NSF survey of major innovations which was mentioned earlier also found that the most frequently mentioned source of major innovations was applied research, most of which was conducted in-house. The second most frequently mentioned source was basic research, most of which was also performed in-house.

Maximizing the efficiency of Federal funds for R&D conducted in industry requires a sensitivity to the comparative advantages of different types of firms. In his book, Science Policy in the United States, Nat C. Robertson of the U.S. - U.S.S.R. Working Group on Science Policy points out that the first principle for promoting innovation is: "Do not expect the advocates of a present technology simultaneously to nurture a new, competing technology." The Congressional Reference Service's Mary Ellen Mogee, in her article "The Process of Technological Innovation in Industry: A State-of-Knowledge Review for Congress," notes: "Although it is true that most small firms perform no R&D or innovation, evidence suggests that small firms that perform these activities do so more efficiently than large firms." She notes that small firms have comparative advantages in invention and other early phases of the innovation-commercialization process and in developing radically new innovations due to the flexibility of these firms and their ease of internal communications. Large firms have comparative advantages in the later phases of the innovation process and in improving and scaling up earlier breakthroughs for mass production and distribution due to their greater financial resources and their more extensive R&D facilities.

The importance of government funding for small firms is highlighted by the National

Science Board's Science Indicators 1980. It confirms what small high-technology firms know from experience; "Year-to-year changes in company funded R&D closely follow changes in cash flow from the preceeding year." Small firms find it difficult to attract the funds necessary to support basic and applied research on ideas still at the conceptual stage. The higher debt-to-equity ratios of many of these firms limits their access to outside capital sources utilized by larger firms, a problem compunded by the present high interest rates and tight credit markets. In earlier hearings on this legislation, representatives of the venture capital community testified that venture capitalists are reluctant to invest in companies without a proven track record or in projects which are difficult to evaluate since they are still far from the prototype stage. Furthermore, tax incentives for R&D are of little help for companies with low margional tax rates or no taxable income at all. A study by Robert S. Kaplan, Yuji Ijiri, and Michael Visscher of the Graduate School of Industrial Administration at Carnegie-Mellon University concluded: "it would seem that a program of direct government support of innovation is preferable to tax incentives."

Several studies emphasize the importance of government funding during the early years of small high-technology firms and for long-term, high risk projects by these companies. For example, Professor Edward B. Roberts of the Massachusetts Institute of Technology discovered that government support was essential for over 200 firms founded by ex-employees of M.I.T.'s labs and academic departments during the early years of these firms. He also found that these firms rapidly turned to the commercial market for their business. Noting that such firms "seldom fail," Roberts concluded: "The implications of these findings are important. They demonstrate that the flow of entrepreneurs out of advanced technical organizations into their own businesses can create significant technology transfer as well as impressive commercial and economic impact. When the source of these companies is a university or government laboratory, the flow is unquestionably beneficial to society."

II. The unique advantages of Small Business Innovation Research Programs

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Several recent academic and government studies have focused on measures which would improve the efficiency of Federal R&D efforts designed to stimulate innovation in areas of importance to Federal agencies and the country-at-large. William J. Abernathy of the Harvard Business School and Balaji S. Chakravarthy of the Wharton School at the University of Pennsylvania have emphasized the importance of providing for both technology push (i.e. direct government support for the development of new technologies) and technology pull (i.e. government provision of incentives for the use of new technology by the private sector or the government itself). Herbert I. Fusfeld and Richard N. Langlois of the New York University Center for Science and Technology Policy and Richard R. Nelson of the Yale University Institution for Social and Policy Studies recommend on the basis of their review of civilian-sector R&D programs that: "Federal support for applied research and directed basic research should be guided by specific arguments about particular technologies and types of projects "undersupported" by the private sector -- not by general arguments about the overall inadequacy of private R&D spending. And any proposal for programs to intervene in private sector R&D should have a clear and specific structure in mind to allocate the research dollars."

Small Business Innovation Research programs have been found to be effective means for increasing the efficiency of Federal government R&D efforts and for attracting private capital to commercialize the results of Federally-funded R&D. In its 1981 report, "Consistent Criteria Are Needed to Assess Small Business Innovation Initiatives," the Government Accounting Office concluded that the NFS SBIR Program meets all the criteria necessary for innovation to occur. These criteria are: 1) encouragement for the exploitation of technological opportunity, 2) provision of a mechanism to insure that the firm sponsoring the innovation has the managerial and technical capacity to support the innovation process, 3) provision of a mechanism to insure adequate financial and human resources, and 4) encouragement of innovation in technologies and industries in which small businesses can be expected to assemble the necessary resources to support innovation. The House Subcommittees on Investigations and Oversight and Science, Research, and Technology concluded: "NSF's Small Business Innovation Research (SBIR) program is an outstanding example of how a Federal agency can encourage and promote innovation," and recommended, "Federal agencies should examine NSF's SBIR program and implement similar type programs which comport with their own needs." Last session, the House Committee on Science and Technology described the NSF SBIR program as one of NSF's "most successful initiatives outside of the core university basic research support programs" and praised its ability to link technology push and technology pull features.

H.R. 4326, like its companion version in the Senate, was drafted to maximize the benefits that SBIR programs bring to science and technology. Small firms must first successfully complete a feasibility study before they can even compete for major R&D funding. Peer review is required on at least Phase II proposal The Office of Science and Technology Policy is given a major role in the oversight of the implementation and operation of the legislation. And to ensure that the results of Federally-funded R&D do not sit on the shelf, between Phase II proposals of approximately equal scientific and technical merit, those proposals which have attracted follow-on commitments of private capital to commercialize the R&D results are given preference.

This legislation also ensures the agencies sufficient flexibility to implement the programs in ways which comport with their own needs. It vests the agencies with sole authority over the topics of projects to be included in SBIR solicitations, over the evaluation of SBIR proposals, over the selection of awardees, and over the administration of SBIR funding agreements. At the same time, the legislation ensures that bureaucratic inertia does not inhibit the vitality of the programs by earmarking a small percentage of an agency's total R&D budget for an SBIR program.

Not surprisingly, this legislation has attracted broad bipartisan support. The Senate passed its version by a vote of 90 to 0. President Reagan has stated that all sectors of the economy are likely to benefit from this legislation.

III. The benefits this legislation will create

The NSF's SBIR program has demonstrated that significant benefits can be created even though, unlike many other Federal programs, the SBIR program places a minimal financial burden on the Treasury and a minimal administrative burden on participating small firms and the agency. SBIR projects secure R&D work for the Federal government which is of comparable quality to work currently funded at universities, large businesses, and non-profit institutes. In addition, SBIR projects have attracted over $4 of private sector money for each $1 of Federal funds in the process of moving through Phases I and II. This spurs the development of new technologies and their commercialization by facilitating the ability of small firms to attract private capital. At the same time, it benefits investors by lowering the risks associated with longer-term R&D investments.

The growth that participation in NSF's SBIR program brings to small firms indicates that establishing programs throughout the government would enhance the career opportunities for scientists, engineers, and skilled technicians -- as well as other workers. In addition, since over half of the participants in the NSF program have coupled with either universities or university-based researchers in the course of their projects, establishment of SBIR programs throughout the government would provide a major impetus for new types of university-industry-government partnerships in R&D. These partnerships will involve both large and small companies. Many large firms have already entered into agreements with NSF participants to license new technologies developed through the program or to fund further research on the technologies.

The citizenry as a whole will benefit from this legislation. We need new technologies which will make our workplaces safer and healthier for those who work in them and those who live by them. We need new technologies which will provide meaningful and satisfying employment. And we need new technologies which will provide new, high quality, useful, and inexpensive products. The Small Business Innovation Development Act is a modest approach to the development of the technologies we will need to face the challenges of the future.

F.A.S.

FEDERATION OF AMERICAN SCIENTISTS
307 Massachusetts Avenue, N.E.
Washington, D.C. 20002 (202) 546-3300

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February 1, 1982

Chairman Don Fuqua
Committee on Science and Technology
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

In response to your request for a written statement on H.R. 4326 (the Small Business Innovation Development Act), and its Senate counterpart measure, S.881, I am submitting the following remarks,the major points of which have been circulated to our National Council and approved, albeit with some dissent.

ON S.881

In fulfillment of its responsibilities to encourage technological innovation, and an efficient use of R&D resources, the Federation endorsed and encouraged a bill, S.881 providing a set-aside of 1% of R&D funds for small business. The justification for this bill was, and is, based on the evidence that small business has been particularly innovative in its research, and on the view that its access to government R&D funding is hampered by the small size of small businesses.

Needless to say, the track-record of small business is based, on the whole, on its work in applied research and development rather than basic research. Private corporations have always under-funded basic research precisely because it is impossible to patent and hence impossible to profit from directly. And small business is especially insulated, because of its size, from engaging in basic research.

Accordingly the justification for the bill militates for small business getting advantages in its applications for applied research and development and not for its securing any special claim for such basic research funding applications as it might sometimes produce. Put another way, we do not see any reason, in the evidence for the bill, to give small business a break in the competition for basic research funds. On the contrary, we think it a bad precedent if basic research funding were to be given out in a fashion that was, in any way, biased from the traditional peer review process.

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In any case, and for these reasons, we had anticipated that the agencies, who have discretion in the kinds of research they can use the "set-aside" for, would desire to use the set-aside in the applied research and development area and, indeed, that they would not find it possible to find much in the way of small business applications in the basic research area. We continue to hold to this view.

However, concern having arisen over the impact of this bill for basic research funding, we see merit in the explicit addition to the pending legislation of a complete exemption for basic research--which is to say, for the requirement that the 1% quota required in S.881 being drawn from the applied research and development budgets of the agencies involved.

This having been said, it should also be pointed out that much of the concern alluded to above, though likely to be tranquilized by the exemption involved, would not in fact be addressed technically by this exemption. Read closely, some elements of the scientific community are really objecting to the possibility that any advantage for small business--albeit one that is kept within the applied research area--might, by laying even an additional 1% constraint on the funding process for research, somehow encourage a shift in allocation of resources from basic research to applied research within an agency.

With regard to this problem, we do not see S.881 giving agency heads, OMB, or Congress, any greater ability to shift intra-agency allocations between basic research and applied research than they have already. Put simply, any agency director who wants to cut basic research to the advantage of applied research and development can always do so. A requirement laid on an agency head that he give out some of the latter on a preferential basis to small business does not require, or even suggest, that he or she cut the former.

The Federation of American Scientists is not a special interest group. Our public interest concerns should dominate the diverse vested interests of our members. It is true that we support completely the Government commitment to basic research and to peer review for that research--research which is engaged in by many of our members. But we do so on the evidence that, otherwise, this research would be under-funded by private business and that it is badly needed for the Nation's progress.

This particular legislative event shows an analogous, if less deeply felt, commitment to a similar proposition: that the Government commitment to small business applied research and development would be under-funded without some further small "set-aside" and that the Nation's advance would be helped, accordingly, by such set-aside. In this area, few if any of our members have any interests at all.

In an increasingly "zero-sum" society, it is hard enough to satisfy the real conflicts between valid propositions on the spending of Government monies. Especially with a total exemption barring even the infrequent occasional application of basic research funding on a preferential basis,* we do not see a real conflict remaining between the valid interests of these two important communities.

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*Small business is, for the first time, now eligible for application for Government basic research grants under other legislation; so the issue is only whether it should be eligible on a preferential basis.

We also wish to point out that the drafting of S.881 has led some to suggest that it requires a "ratcheting upward" of SBIR levels of funding--a ratcheting which the staff of the Small Business Committee in the Senate advises us is unintended, if there. We would like this matter clarified by an appropriate phrase. The bill should certainly not become a loophole through which ever larger set-asides are mandated.

ON H.R. 4326

With regard to H.R. 4326, we do not support the level of funding in excess of 1%. Set-asides in excess of 1% would cause clear problems for some of the agencies and are, at best, premature. A 1% set-aside is quite adequate to test this concept and approach which, including so many agencies by a single formula, certainly does require testing.

Nor do we support the inclusion, in the calculations, of inter-mural research, and accordingly, we prefer the formulation of S.881 which calculates the Agency level of funding to which the 1% applies, on the basis of extra-mural research only. After all it is only extra-mural research to which small business has a chance to apply.

CONCLUSION

Because basic research is 10% to 15% of the total of R&D, and because small business normally would ask for the *applied* research and development funds, a "set-aside" for small business of 1% of *all* R&D could naturally be expected to come from the 85% to 90% of applied research and development funds. Thus, if the Agency had a budget of $100,000,000 for R&D of which $15,000,000 was basic research, one would anticipate that the 1% of all R&D ($1,000,000) would come largely from the $85,000,000 available in *non-basic* research funding. But this expectation is not logically necessary.

Thus, the first question which Congress must resolve is whether to permit an Agency, which has wide latitude under S.881, to find its mandated 1% for small business by *reducing* its level of basic research. (In our example, it could, in theory, find its $1,000,000 for small business research by reducing the $15,000,000 for basic research to $14,000,000 and using the resultant $1,000,000 "saved" to purchase *applied* research and development from small business.) It is this possibility to which much adverse criticism from the scientific community has been directed.

Obviously, there is no justification for such a reorientation of priorities. The justification for S.881 (and H.R. 4326) is that *small* business is underfunded related to *large* business--*not* that it is underfunded relative to the *priorities* for *basic* research. It would be ironic, and counterproductive, if small business were given basic research monies for applied work because the pool of new ideas for future small business to innovate in applying would be thus reduced. It would not just be robbing Peter to pay Paul but selling the future short.

In sum, whatever happens, the boundary *between* basic research and applied research and development should be preserved under this bill. To repeat there is *no justification whatsoever* in the premises of either bill for changing the allocation of resources between basic and applied research just to help small business.

Now even if this boundary is preserved, a second question arises for Congress. Some of the $1,000,000 mandated to go to small business in this example, could, in principle, be fulfilled under S.881 by finding some small businesses that were doing *basic* research. While most small businesses are not applying for basic research monies, they may legally do so now and some might. What of this? Such a diversion would not be a "tax" on basic research although it could be a diversion from *university based* basic research to *small business based* basic research.

We have not proposed permitting this because, while it prevents the "raiding" of basic research monies for "applied research" monies, it has other problems. We want basic research monies given out under peer review and, in general, under completely unbiased standards. And if there is to be *no bias* toward small business in basic research grants, then why count the monies spent on those small businesses doing basic research toward a set-aside? This would seem to create a much-ado-about-nothing situation in which the scientific community would worry that there was hidden bias of some kind (to fulfill a quota), while the small business community, fearing there would be *no* bias, would want their quota of set-aside to come from the applied budgets and not wasted on those firms which win their basic research in fair competition.

But, most important for us, there is no justification in the premises of the bill, or the evidence for the bill, for any involvement of small business and basic research in any special allocation, quota, or set-aside at all. This is, for us, the basic desiderata, since we cannot support funding diversions for which there is no evidence. And if the funding is not a diversion, why involve it in the bill.

In retrospect, it appears that the bill's life would have been simpler if the quota (1% or whatever) were applied to the Agencies extra-mural activities in *applied research and development* rather than to the full R&D budget and if, consistently, the set-aside were conducted totally within the applied research and development boundary.

Perhaps, in time, this will be a simplification possible. But, at least for the moment, we think, however the quota are derived, that the basic research budgets should be: a) left alone, and b) that whatever small business does receive for basic research should not be counted against the quota. (If it is counted then we would, of course, argue for the unbiased peer review we alluded to earlier.)

Sincerely,

Jeremy J Stone

Jeremy J. Stone

JJS:jff

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*EXECUTIVE COMMITTEE

January 12, 1982

RECEIVED
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COMMITTEE ON SCIENCE
AND TECHNOLOGY

The Honorable Don Fuqua, Chairman
Committee on Science and Technology
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

On behalf of the membership of the National Association of Small Business Investment Companies, I would like to express strong support for H.R. 4326, the Small Business Innovation Development Act that was reported from the Small Business Committee on October 22.

The National Association of Small Business Investment Companies is a Washington-based trade association which represents approximately 300 Federally licensed small business investment companies(SBICs). Our members provide long-term debt, equity capital and management assistance to small companies with significant growth potential. A recent study by Deloitte, Haskins & Sells and Arthur D. Little, Inc. showed that SBIC-financed small concerns experience growth rates -- in key areas such as sales, assets and employment -- up to 10 times as great as other small businesses. In addition, they generate more than 5 times the Federal tax revenues.

The small concerns assisted by SBICs represent many different fields and industries, but a significant number are involved in high-technology research and development. Because of the financial risk, however, very few investors are able to fund start-up operations in high-technology or to finance work still at the idea stage. Under H.R. 4326, certain agencies would devote a specified percentage of their R&D budgets to the establishment of a three-phase small business innovation research program, similar to that now in existence at the National Science Foundation. Small companies would respond to solicitations in targeted research areas, and those with the most promising proposals would receive Phase I money to conduct feasibility research. At the end of a certain period, Phase II awards would be granted to the most successful projects for the principal research effort. At that time, the small concern would be requested to seek follow-on venture capital from a private source to finance the commercial application of the product developed in the first two stages.

Thus, such a program could serve as a pre-screening of investment opportunities for venture capitalists seeking to invest in small, technology-oriented growth companies. In addition, the program would provide incentives for the small firm to pursue commercial development of its work. The increased number of high quality investment opportunities that will result from the establishment of an SBIR program in numerous federal agencies, and the added impetus for small high-tech firms to seek venture capital at an early stage, will be a tremendous boost to innovation in this country.

NASBIC testified in favor of similar legislation in the Senate, and I have included a copy of that testimony. I would like to reiterate our support for a small business innovation bill in the House. It has been proven that individual entrepreneurs and small business people are the primary instigators of innovation in our society, yet less than 3.5% of all Federal R&D money goes to independent firms today. H.R. 4326 contains an efficient and cost/effective approach to the problem of lagging innovation, and I urge the Committee to act promptly and favorably on this bill.

If we can provide additional information to your Committee, we would be pleased to do so.

Sincerely,

Walter B. Stults
President

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May 13, 1981

STATEMENT OF
James L. Watts
Before The
SMALL BUSINESS COMMITTEE
UNITED STATES SENATE

GOOD MORNING MR. CHAIRMAN AND COMMITTEE MEMBERS:

I am James Watts, Associate Director of the National Association of Small Business Investment Companies. Accompanying me is Andrea Hatfield, NASBIC's Legislative Representative. I appreciate the opportunity to appear before you today to express NASBIC's support for S.881, the small business innovation bill introduced by Senator Rudman and cosponsored by the Chairman and other Committee members. I commend you for your efforts in this important area.

In a 1978 report to the Assistant Secretary of Commerce for Science and Technology, the Work Group on Job Creation said: "The ability of our economy to carry out technological innovation -- to introduce commercially successful new products, services and processes -- is the foundation of both our domestic prosperity and our international competitiveness." Studies have indicated that individual entrepreneurs and small businesses historically have been the primary instigators of innovation in our society. A National Science Foundation report showed that from 1953-1973, small firms (those with less than 1,000 employees) produced 24 times as many innovations per R and D dollar as the largest firms (with more than 10,000 employees), and four times as many as medium sized firms.

In spite of this impressive record, today only 3.3% of all Federal R and D money goes to independent firms. Small business is unable to compete with large corporations for government contracts; in fact, in 1977, only 8% of all Defense Department contracts were awarded through competitive procurement.

The overall climate for innovation in the U.S. has deteriorated dramatically since the 1960's. Federal R and D expenditures have decreased by at least 5%; the portion of private spending devoted to basic research has declined 20%. Tax policies have not been conducive to risk taking and experimentation, and the morass of new safety and environmental regulations have forced many companies to devote their time and money to compliance rather than to the development of new products. Inflation, both a cause and a result of this situation, has made it difficult for most firms to generate the capital necessary to invest in research and development.

The consequences of declining technological innovation are severe and widespread. Within our own borders, industrial equipment becomes obsolete without being replaced; fewer new jobs become available if innovation does not spur growth; productivity drops and inflation increases.

Furthermore, the long-term survival of American enterprise in international markets depends upon the twofold ability of U.S.-based companies to maintain product competitiveness through R and D and to expand foreign operations so as to protect market share. While in 1960 the U.S. had 18% of the world export market, that figure had declined to only 12% in 1978. According to the American Electronics Association, while R and D intensive manufacturing industries contributed a $29 billion export surplus to the U.S. balance of trade, non-R and D intensive industries racked up a $24.6 billion deficit in 1979.

Certainly changes in the tax code to encourage investments in R and D are needed. In addition, greater small business participation in the innovation process is mandatory. Small business has amply demonstrated its ability to innovate quickly and efficiently. We must exploit that talent in order to revive technological innovation in this country. The approach contained in the Rudman-Weicker bill to make more money available to small firms is an excellent one, we feel, since it utilizes the format developed by the National Science Foundation for its highly successful Small Business Innovation Research program.

Under the NSF program, proposals are solicited on a number of different research topics from small high technology firms. The most promising of these firms are given Phase I awards of $30,000 to conduct feasibility research. At the end of a six month period, Phase II awards are granted to the most successful research projects. Phase II is for the principal research effort over a two year period. At the time an application is submitted for a Phase II award, the applicant is requested to include a commitment for follow-on venture capital or other funding for the Phase III awards, which finance the commercial application of the product developed in the first two stages.

This combination of government and private funding has proved extremely successful for a number of reasons. Importantly, it provides incentives for the small technology firm to pursue commercial development of its work. Most Federal R and D contracts do not provide such incentives; many small companies simply go from one government contract to another, never attempting to make their work commercially viable.

In addition, the program serves as a pre-screening of investment opportunities for venture capitalists seeking to invest in small, technology-oriented growth companies. A venture capitalist's work is by nature extremely risky; very few investors are willing to compound the risk factor by funding work still at the idea stage. Through the Small Business Innovation Research program the work of these small firms is carefully evaluated and only the best are selected for Phase II awards. The venture capitalist has the opportunity to come in at the product development stage, after the research has been successfully completed. Although the venture capital commitment is generally secured prior to the award of Phase II funding by NSF, its completion is contingent upon the small firm's achievement of stated objectives. The risk to the venture capital firm is thereby reduced.

Several extremely successful companies have emerged as a result of NSF funding. Probably the best known are Omex, the California-based computer firm which attracted follow-on capital of $4-5 million from a venture capital firm, and Collaborative Research in Waltham, Massachusetts, which received follow-on capital of $8-9 million and expects an additional $20 million from private placements. In addition to these companies, others such as Scientific Process and Research in New Jersey and Moleculon Research Corp. in Massachusetts have received substantial amounts of venture capital.

If all agencies with R and D budgets above $100 million devote 1% of their total R and D outlay to a Small Business Innovation Research program as required in S.881, approximately $300 million per year will be channeled into small business research and development by 1984. In addition, hundreds of millions of venture capital dollars will flow into high technology projects in targeted areas.

Such a program would undoubtedly be a good investment for Uncle Sam. A study conducted by the American Electronics Association showed the tremendously beneficial effects of equity investments in young electronics firms. AEA found that for every $100 of venture capital invested in companies founded between 1971 and 1975, those companies generated in 1976 alone: $70 in exports; $33 in R and D; $15 in federal corporate income taxes; $15 in personal income taxes; and $5 in state and local taxes. Another study of the effects of SBIC financing on small firms, conducted by Arthur D. Little, Inc., showed that SBIC-backed companies had growth rates up to 10 times as great as other small firms in such key economic impact areas as job generation, sales and assets.

The increased number of high quality investment opportunities that will result from the establishment of an SBIR program in every federal agency, and the added incentives for the small high tech firms to seek venture capital at an early stage, will be a tremendous boost to innovation in this country.

In conclusion, I would like to reiterate NASBIC's strong support for this legislation. Solving the problem of lagging innovation is one key to our economic recovery, and the Rudman-Weicker bill contains an effective and cost-efficient approach in that direction. I hope the Small Business Committee will report the bill favorably in the near future.

THE JOHNS HOPKINS UNIVERSITY
SCHOOL OF MEDICINE
725 NORTH WOLFE STREET
BALTIMORE, MARYLAND 21205

February 3, 1982

A statement from the basic science department directors of the Johns Hopkins Medical School regarding HR 4326 (Small Business Innovation Development Act of 1981).

We understand the goal of the bill, which is to stimulate technological development and innovation by targeting a share of Federal R&D funds to small R&D companies. However, as laboratory research scientists, we are certain that this act will harm basic biomedical research and suggest amendments which would prevent this adverse effect.

The fundamental problem is that any automatic set-aside in R&D budgets will divert funds from basic biomedical research at a time when the real value of funds for biomedical research is declining. Small businesses are in general neither interested in nor qualified to conduct basic research, particularly in most areas of biology. To the extent that small businesses are interested in basic research and have sufficient expertise, recent changes in NIH regulations allow such for-profit firms to compete for the available grant funds, eliminating the need for a special set aside.

We urge that the bill be amended to exempt basic research funds from the small business set-aside. An alternative amendment giving each appropriations committee jurisdiction over implementation of the small business program in its area might accomplish the same goal, but would leave some uncertainty about the impact on basic research.

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March 1, 1982

POSITION OF
ELECTRONICS ASSOCIATION OF CALIFORNIA
CONCERNING
SMALL BUSINESS INNOVATION
(H.R. 4326)

The Electronics Association of California (EAC) represents some 450 rapidly growing high-technology firms in California. Founded a little over five years ago specifically to serve the needs of small and medium-sized high-technology companies, the Association has experienced dramatic membership growth.

The Electronics Association of California wishes to go on record supporting legislation to encourage and support Small Business Innovation as expressed in the objectives of H.R. 4326 & S. 881. This decision was reached by the EAC Board of Directors after responses to a membership survey reflected an almost 2 to 1 edge (65%) in support of the legislation. Our full membership was polled by the survey (copy attached) after the EAC was asked by various Congressional members and staff to present our views on this legislation. We received written responses from one-third of our members in less than 10 days and the survey results are provided herein.

The thirty-seven page Report issued by the House of Representatives Committee on Small Business clearly identifies, with substantial research and documentation, the potential advantages of this legislation. The key issue addressed was, "Will this legislation, if enacted, effectively aid in the advancement of technology in America?" There is no issue of more importance to the long-range economic and defense strengths of the U.S.

H.R. 4326 and S. 881 are aimed at stimulating innovation in general and at stimulating the technological and innovatively oriented small business sector. Past studies, as reflected in the Small Business Committee report, have shown that 1) small firms with up to 1,000 employees produce about 24 times as many major innovations per R&D dollar as large firms with over 10,000 employees, and four times as many as medium-sized firms, and that 2) the ratio of innovations to sales is one-third greater in small, high-technology firms than in their counterparts.

Assuring this important segment the opportunity to actively participate in the Government's R&D work would prove beneficial to America and properly complement the work of universities, the private venture capital community (short-term commercial dollar return) and contributions by the larger companies in the industry. We support the strong basic research efforts being pursued by the universities and believe that the proposed legislation can serve as an important link between basic and applied technology. This legislation would provide a unique opportunity for small high-technology companies to present their products, services and capabilities to the Government. Almost all R&D requests currently advertised by the U.S. Government are stated in terms of requirements defined by the Government program managers, often without a good understanding of capabilities or products available from industry. This legislation will require the Government personnel to review the best innovative ideas presented by small industries and the most advanced work will have a forum for presentation that does not now exist.

Special legislation affecting research and development is not a new concept. In fact, similar laws regarding small business set-asides for production contracts exist today. R&D set-asides for smaller firms will create a more competitive environment to insure that production contracts contain the newest and most advanced technology.

Regarding implementation of the legislation, we suggest the following for consideration:

1) S. 881 calls for a 1% set-aside annually while H.R. 4326 calls for a set-aside starting the first year at .5% with annual increases reaching 3% in 1986. We realize the House and Senate will eventually have to reach agreement on the amount of dollars to be allocated for this program and the 1% level seems appropriate to us at this time. Tied to the dollar allocation should be a periodic congressional review of the legislation to insure that the initial objectives are being accomplished.

2) To minimize abuses of the program we might suggest that SBIR contracts be limited to a small percentage of a firm total sales (i.e. 20% for on-going businesses. Further we recommend that firms be limited to 10% of the funds of any one funding agency.

3) It is important that effective implementation of this legislation not be hindered by undue Government regulations. Innovation requires flexibility more so than production contracts. This must be recognized by the program administrators if we are to realize maximum innovation and technological advancement from the legislation.

4) Government paperwork, desire to over-control, added bureaucracy and inefficient administration were the major reasons cited by companies opposing this bill. Since this program is intended to foster development, we recommend the contract reporting mechanism focus on progress of the work and minimize ancillary reports.

Further information may be obtained by contacting:

Electronics Association of California
185 San Gabriel Drive
Sunnyvale, California 94086
Phone: (408) 736-7600

President: James J. Conway

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February 2, 1982

URGENT - RESPOND BY FEBRUARY 10

TO: Presidents of EAC Member Companies

FROM: Jim Conway

SUBJECT: THE U.S. CONGRESS HAS REQUESTED YOUR ADVICE BEFORE THEY VOTE TO APPROVE OR DISAPPROVE AN IMPORTANT PIECE OF LEGISLATION AFFECTING OUR INDUSTRY

Last week several key members of the United States Congress suddenly called me to ask for our industry views regarding proposed legislation (H.R. 4326) to allocate federal research and development (R&D) dollars specifically for small high-technology firms. A major controversy has just developed which I will describe in this letter. I told them I would outline the issue, ask each member company president to give me his opinion and forward the responses to all members of Congress. This is an important issue, and I urge that you take a few minutes to read the following material and return the attached yellow questionnaire immediately.

SMALL BUSINESS INNOVATION
(H.R. 4326)

WHAT THE BILL WOULD DO

This legislation is designed to strengthen the role of small science/technology-oriented firms in the federal research and development process. The goal of H.R. 4326 is to help federal agencies effectively meet their R&D needs by utilizing small innovative companies. It, furthermore, attempts to improve the transfer of technology developed under federal R&D programs to the private sector.

The bill report contains Congressional conclusions:

1) that small business is a major source of innovation when compared to large business, universities and government-owned laboratories;

2) that there is a disproportionately minor involvement of small business concerns in federally funded research and development;

3) that it is in the national interest to strengthen the role of small business in innovation and commercialization of innovations derived from federal R&D.

HOW THE BILL WOULD WORK

- The bill would provide for the establishment of a Small Business Innovation Research Program (SBIR). Under this program, a portion of a federal agency's R&D effort would be reserved for awards to small business (500 employees and less).

- Each federal agency which has an R&D budget in excess of $100 million would expend not less than .5% in 1983, increasing to 3% in 1986 for this program.

- Any federal agency which has a budget for R&D in excess of $20 million but less than $100 million would establish annual goals specifically for R&D funding agreements with small business concerns.

- Each SBIR program would have a three-phase process by which federal R&D funds would be awarded:

  A) a first phase determining the merit and feasibility of ideas submitted by firms pursuant to SBIR program solicitations; (funding awards range: $30-$50,000)

  B) a second phase to further develop the proposed idea to meet the particular program needs; (funding awards range: $100-$500,000)

  C) where appropriate, a third phase in which non-federal capital pursues commercial applications of the R&D and which may also involve follow-on production contracts with a federal agency.

DOLLAR IMPACT

It is estimated that the 1982 R&D expenditures of major government agencies would be $40 billion. The first stage of this legislation (.5%) would direct $200 million into the program.

The bill does not authorize or require that any new federal money be funded for this program. Rather, 0.5 percent in the first fiscal year, 1 percent in the second fiscal year, 2 percent in the third fiscal year and 3 percent in all subsequent fiscal years of each qualifying agency's R&D budget would be reallocated to fund this program.

ARGUMENTS IN SUPPORT OF H.R. 4326
(House of Representatives Small Business Committee report)

High-technology, innovative small businesses have been found not only to provide some of the greatest advances in the country's technology base but to be the most cost-effective innovators. Over the past three decades, small, high-technology companies have been the generators of most pioneering innovations. Their involvement in the innovation process is greatest at the earliest and riskiest stage and in what initially appears to be small markets.

Directing a larger share of federal R&D to small firms will increase needed competition in federal R&D and competition in the marketplace. Both should benefit the United States. The proposed allocation of R&D dollars for smaller firms is a very small amount of total expenditures and should not threaten others now participating in basic and applied research.

ARGUMENTS AGAINST H.R. 4326

A national electronics trade association, speaking on behalf of its members, has just expressed its opposition to this bill. In their view, the real problem affecting small business is not an anti-small business bias of civil servants, as some claim, but the unbelievable complexity of the federal procurement process that has developed over the last 30 years. Even if the procurement system were simplified, however, they stated in a recent mailing to their members that they fundamentally oppose political intervention in the marketplace on behalf of special interest groups.

Others have testified that recent changes in tax laws and new investment structures have generated in the past four years enormous amounts of new risk capital for starting up and growing small companies. Also, opponents have charged that the proposed set-asides would be an ineffective and poor use of government R&D funds.

CURRENT STATUS OF BILL

1) In January of 1980, the White House Conference on Small Business (attended by EAC representatives Bill Byars and Terry Bibbens) adopted as one of its fifteen major recommendations support for the Small Business Innovation Act calling for special small business research and development programs.

2) The U.S. Senate, voting 90-0, enacted its version of the bill (S.881) on December 8, 1981. This bill calls for not less than 1% R&D allocations for small high-technology firms.

3) The program has been endorsed by Presidents Carter and Reagan.

4) The House of Representatives Small Business Committee reported out its version (H.R. 4326), voting 40-0 in favor of the bill.

5) The bill is currently being reviewed by the Science & Technology, Energy & Commerce, Armed Services and Veterans Affairs Committees. Opposition to the bill has now surfaced. A vote by the full House of Representatives is expected soon.

CONCLUSION

First, this bill should not be viewed as a big versus small company issue. The key question to be addressed is, "Will this bill, if enacted, effectively aid in the advancement of technology in America?" R&D spending is a crucial element in the innovation process. Over the past decade, the federal government's support of R&D has accounted for slightly more than one-half of all R&D funds spent in the U.S. Competition from foreign countries is threatening and we must do everything possible to maintain and improve our technological leadership in the world marketplace. IN YOUR OPINION, WOULD THIS GOVERNMENT PROPOSAL BE HELPFUL IN PURSUING THAT OBJECTIVE?

YOUR VOTE PLEASE

Return the attached form to EAC by February 10.

Note: Complete copies of the legislative bills are available for review at the EAC office.

QUESTIONNAIRE

FEDERAL R&D DOLLARS FOR HIGH-TECHNOLOGY

Please complete and return this form by February 10 to:

Mr. James J. Conway, President
Electronics Association of California
185 San Gabriel Drive
Sunnyvale, California 94086

☐ We support current legislation (S.881 and H.R. 4326) to establish federal research and development (R&D) dollars specifically for small high-technology firms.

☐ We oppose current legislation (S.881 and H.R. 4326) to establish federal research and development (R&D) dollars specifically for small high-technology firms.

COMMENTS: ________________________________

____

____

____

Signed: ____________________

Name: ____________________

Company: ____________________

APPENDIX III

QUESTIONS SUBMITTED TO DENIS PRAGER, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

1. QUESTION:

In your testimony, you indicate the OSTP could take on the responsibility for monitoring SBIR programs. Does OSTP want that responsibility? Will OSTP require additional resources to monitor the SBIR Act?

ANSWER:

Through the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET), OSTP has a mechanism for facilitating the coordination and oversight mandated by H.R. 4326 and its Senate counterpart S.881. Upon passage of SBIR legislation, a FCCSET committee on Small Business Innovation Research would be established with the chairmanship assigned to an appropriate agency. Since the responsibility for the functioning of a FCCSET committee rests with the participating agencies, effective coordination and oversight could be accomplished without the commitment of significant OSTP resources. For this reason, it is not anticipated that OSTP will require additional resources to monitor the SBIR Act.

2. QUESTION:

The Office of Federal Procurement Policy is considering proposals to streamline the federal procurement process. Are proposals of benefit to small business expected?

ANSWER:

Yes. It is anticipated that several steps being considered by OFPP to streamline the federal procurement process will have direct or indirect effects on small business.

3. QUESTION:

What assurances do we have that small businesses can absorb the amount of funds provided under S.881?

ANSWER:

There can, of course, be no assurances that small businesses can absorb the funds provided by S.881. We do know, however, that the small NSF and DoD programs have generated interest among the small business community far in excess of the limited funds available. Further, the SBA and others have testified to the great need among small businesses for pre-venture capital to support early concept development. By limiting the set-aside to 1% and phasing it in over a three-year period, S.881 is sensitive to the need for a gradual transition from the current small program involving a relatively few small businesses to a much larger program involving many more firms.

4. QUESTION:

If small businesses cannot absorb funds available under the bills, in what way should we amend the legislation to enable agencies to utilize the funds wisely? What quality controls are there?

ANSWER:

One of the criticisms of the use of set-asides to fund specific R&D programs is that the requirement to allocate a fixed amount of agency funds could lead to the funding of lower quality R&D. For this reason, it is critical that each agency with an SBIR program apply to that program evaluation criteria no less rigorous than those applied to other R&D programs. We must assure that the SBIR program in each agency is, in every way, of equal quality to other agency R&D programs. With rigorous quality control mechanisms in place, the question then is: what happens to unexpended set-aside funds when an agency has determined that too few proposals are of sufficient quality to meet evaluation criteria established. Should the agency lose those funds or should it have the opportunity to apply those resources to other programs? The administration has not taken a specific stand on these questions but believes them appropriate for consideration by this Committee.

5. QUESTION:

Will standardization and coordination requirements imposed on agencies constrain needed agency flexibility in conducting SBIR programs?

ANSWER:

Standardization and coordination are important to the early stages of extending the SBIR program to additional agencies. It is not anticipated that the requirements imposed by S.881 would unduly constrain agency flexibility.

6. QUESTION:

The objectives of this legislation are to assist small business and to produce the R&D which the government needs. Have we found ourselves in a situation where the combination of these objectives acts to hamper the achievement of each of these objectives?

ANSWER:

There is no reason why, if agencies support high quality R&D designed to meet agency missions and conducted by qualified small businesses, the objectives of both the agencies and the small businesses should not be achieved. Based on the limited experience of the NSF SBIR program, it seems clear that steps can be taken to assure that small business R&D can be funded in such a way as to achieve the objectives of the small business as well as to further the missions of individual agencies.

7. QUESTION:

You state in your testimony that this legislation proposes to increase small business innovation through direct government spending arising out of federal R&D funds set aside. Is this not contrary to the Reagan Administration's policies of less government interference in the marketplace?

ANSWER:

Because the SBIR program is designed to fund early concept development needed to support proposals for private venture capital, this approach is not considered to be contrary to the Reagan Administration's policies of non-interference in the marketplace.

QUESTIONS SUBMITTED TO DONALD TEMPLEMAN, SMALL BUSINESS ADMINISTRATION

SBA
U.S. Small Business Administration Washington, DC 20416
Office of the Administrator

1. QUESTION: Under Section 15 of the Small Business Act, agencies are required to set goals for the participation by small businesses in federal procurement.

-- Who sets these goals?
-- Has the Congress ever specified goals?

ANSWER: In accordance with Section 15 of the Small Business Act, agencies' goals participation by small business in Federal procurement are established jointly between the individual agency and the Small Business Administration. In the event that the agency and SBA cannot negotiate goals acceptable to each, the matter is referred to the Administrator of the Office of Federal Procurement Policy for resolution.

The Congress has never specified goals.

2. QUESTION: What would you estimate the size of the high technology small business community to be? How many small businesses are listed in the PASS System (Procurement Automated Source System)? How many of these are R&D firms?

ANSWER: We estimate there are between 15-20,000 small firms whose principal work is in the research and development (R&D) field. There are estimated to be between 20-30,000 small firms who have R&D capability as a part of their principal function; i.e., manufacturing. As of January 31, 1982, there are approximately 62,000 small firms listed in PASS. Of this number, 12,607 are either research and development houses or possess research and development capability, along with other capabilities such as manufacturing.

3. QUESTION: The 1977 Rabinow Report recommended the SBA expand its technology trained staff to advise small, high technology based firms. How did the SBA respond to this.

ANSWER: SBA responded to the 1977 Rabinow Report by augmenting its technology staff through use of other resources. We have joint agreements with NASA to utilize the services of four of that agency's jointly sponsored Industrial Research Application Centers. The four involved are: the Northeastern Research Application Center at the University of Connecticut; the Kerr Application Center at the University of Southeastern Oklahoma; Western Research Application Center at the University of Southern California; and the Application Center located at Purdue University. Additionally, the SBA has contracted with the University of Kansas to provide technology assistance and advice to small firms located in the five state area comprising SBA's Region VII because we did not have a trained Technology Assistance Officer in that region.

4. QUESTION: What expertise and actual experience in research and development, and Federal procurement does SBA possess in order to carry out your responsibilities under the bill?

ANSWER: The Procurement and Technology Assistance staff of SBA collectively, has in excess of a thousand years hands-on experience in Federal procurement. A significant portion of this experience has been in the R&D field.

5. QUESTION: Your statement cites complex regulations and paperwork barriers as discouraging small business from participation in Federal procurement programs. How will the bill change this situation.

ANSWER: We do not anticipate that the Small Business Innovation Research Bill will change the complex regulations that currently discourage small business from participating in the Federal procurement process. However, we anticipate that the solicitations that would be required for participation in the SBIR program would be far less complicated than regularly structured Requests for Proposals and would require a minimum of accompanying documentation.

6. QUESTION: You indicate that complex regulations serve as a disincentive for agency officials to utilize small firms and that it is easier to work with large firms. What regulations make this so and why?

ANSWER: The Defense Acquisition Regulation governs procurement by the Department of Defense. The Federal Procurement Regulations govern procurement by all civilian agencies with the exception of NASA, which has its own procurement regulations. Consequently, a small business that may desire to pursue procurements, including the R&D field, from, for example, NASA, DoD, and a Federal civilian agency, would be required to comply with and have expertise in three separate sets of procurement regulations. Large firms have the resources to devote to following the changes that are continually evolving with these regulations and can, therefore, cope and comply with agency contracting officials' requirements much easier than small business, which finds itself in a disadvantageous position. Agency contracting officials are reluctant to devote the time and energy necessary to insure that small businesses are aware of and familiar with the agency regulatory requirements.

7. QUESTION: The bill calls for the SBA to issue policy directives for simplified, standardized and timely SBIR solicitations. What are your views as to the feasibility of this for all agencies? Would the same format be used for grants, cooperative agreements and contracts?

ANSWER: The SBA believes that the Office of Federal Procurement Policy within the Office of Management and Budget would be a more appropriate agency to issue policy directives for the implementation of the SBIR program. However, the Office of Federal Procurement Policy should coordinate and cooperate with the SBA in its planning for and issuing policy directives. The SBA would be capable of and ready to participate in this effort with the Office of Federal Procurement Policy. SBA believes that it should have an up-front role in the release schedule for SBIR solicitations for all agencies so that the small business high technology community will not be overwhelmed at any given period by a flooding of the market with SBIR solicitations.

8. QUESTION: SBA has discontinued funding the innovation centers under SBA's Technology Assistance Program. Were these not providing a useful service to small businesses?

ANSWER: SBA has not discontinued funding the Innovation Centers and is continuing to review the services being provided to small business by these centers.

9. QUESTION: What other activities does SBA support to stimulate small business innovation?

ANSWER: (1) Assumed the lead role in cosponsoring a national conference for small R&D firms in October 1979. We jointly funded the participation of the American Association of Small Research Companies with the National Science Foundation, the Department of Energy, the National Bureau of Standards, the Department of Housing and Urban Development, and NASA.

(2) Past participation with the National Science Foundation in semi-annual conferences

for small R&D firms, and plan to do so again this fiscal year (New Jersey - Seattle).

(3) Utilization of the PASS system for notification of small R&D firms regarding upcoming conference, seminars, and procurement opportunity meetings.

(4) Provided DoD with small R&D sources to be solicited for their Defense Small Business Advance Technology Program.

(5) An ongoing effort is underway to notify on a daily basis qualified small R&D firms of procurement opportunities selected from the Commerce Business Daily.

10. QUESTION: How does the Small Business Development Centers program relate to S. 881 and H.R. 4326? What are some of the results to date?

ANSWER: Small Business Development Centers can provide some support to small businesses who want to bid on set-aside R&D contracts from Federal agencies. As an example, the University of West Florida manages a computerized INFOBID System to assist small businesses in obtaining Government contracts. This system is an extension of the SBA's PASS (Procurement Automated Source System). The system accumulates RFPs and IFBs from Federal, state, county, municipal and big business entities and categorizes the subject by SIC code. In addition, all participating small business contractors are classified by SIC code and placed in the computer along with RFPs, etc. The computer matches contractors' SIC codes with RFP codes and on a weekly basis mails specified RFP information to contractors. The Small Business Development Center collects information on the dollar amount and number of contracts awarded to small businesses through this system. Approximately 10 percent of the clients in the INFOBID System are R&D and other professional firms capable of R&D activities.

In addition to responding to your questions, I would like to take this opportunity to provide additional material to the Committee to be included as part of the record of my remarks. This material was prepared by SBA's Office of Advocacy.

During the Committee hearings, testimony was provided to your Committee by other witnesses that small firms have 5.5 percent of private sector R&D scientists and engineers but 6.8 percent of R&D prime contracts over $10,000 in FY 1980. The testimony indicated that no adjustment had been made for work that small firms are unable to perform and that the SBA and other agencies may have access to raw data that would yield a more accurate assessment of this issue. My comments are:

1. While small firms would not be able to perform every Federal R&D effort, they are also not capable of undertaking every private sector R&D effort. Both the 5.5 percent and the 6.8 percent reflect this. Asserting that an adjustment should be made hinges on the proposition that Federal R&D is generally and necessarily of a larger scale than private sector R&D.

2. A more complete set of assumptions involving R&D actions indicates that the small firm share of the total is closer to 5.6 percent. The 6.8 percent is actually of prime contract actions over $10,000, leaving out actions of $10,000 or less, grants, and cooperative agreements. However, assuming that:

- R&D actions of $10,000 or less are two percent of larger R&D actions (the figure is 10 percent for all procurement), and
- small firms receive 60 percent of R&D actions of $10,000 or less (which is true for all procurement), and
- contract dollars are twice the dollars disbursed via grants and cooperative agreements, and
- small firms receive one percent of grants and cooperative agreements (which is the best available estimate).

Then it can be calculated that the small firm share of extramural Federal R&D is 5.6 percent. Further, the NSF data on scientists and engineers is for firms with less than 1,000 employees, while the contracts data is generally for firms with less than 500 employees.

3. It has often been said that the NSF data undercounts small firm R&D resources because R&D in small firms tends to be less formal and thus less separated for accounting purposes. Indeed, one of the virtues of small firm R&D is that "operating" personnel are more involved in idea generation and development.

4. Finally, testimony of some of the other witnesses makes the implicit assumption that all parts of the private sector are equally efficient. The evidence on small vs. large firms is to the contrary. Work nearing completion at the SBA indicates that small firms (less than 500 employees) are about 2.5 times as innovative per employee. A total of 225 innovations during the 1970's have been credited to small firms, with 340 credited to large firms. If the relevant comparison were to R&D scientists and engineers in firms with less than 1,000 employees, then small firms would be 7.5 times as innovative. Yet large firms receive 11.5 times as many dollars in R&D contract actions over $10,000.

You may recall at your hearing that a list of 33 inventive contributions of independent inventors and small organizations taken from the Small Business Committee Report on H.R. 4326 was cited by a witness as evidence of the university contribution to invention. In fact, many of these contributions were made by small businesses. Enclosed in an analysis by the SBA Office of Advocacy. Also enclosed is a list containing additional examples of important innovations by small American firms in the twentieth century.

I apologize for the length of our response but I wanted to take this opportunity to clarify issues and questions that have been raised. I hope this information will be of assistance to your Committee in preparing for the mark-up.

Sincerely,

Donald R. Templeman

Donald R. Templeman
Acting Administrator

Enclosures

SOME IMPORTANT INVENTIVE CONTRIBUTIONS OF INDEPENDENT INVENTORS AND SMALL ORGANIZATIONS IN THE TWENTIETH CENTURY

Inventive Contribution	Invention Environment	Innovation Environment
Xerography	Small Firm	Small Firm
DDT	Small Firm?	
Insulin	University	Large Firm
Vacuum Tube	University	Small Firm
Rocket	University	Large Firm
Streptomycin	University?	
Penicillin	University	Small Firm?
Titanium Extraction		
Shell Molding		
Cyclotron	University	Large Firm
Cotton Picker	Small Firm	Small Firm
Shrink-Proof Knits		
Polyester Fiber	Small Firm	Large Firm
Catalytic Petroleum Cracking	Small Firm	Small Firm
Zipper	Small Firm	Small Firm
Automatic Transmission		
Gyrocompass	Small Firm	Small Firm
Jet Engine	Small Firm	Large Firm
FM Radio	Small Firm?	Small Firm?
Self-Winding Wristwatch		
Continuous Hot-Strip Steel Rolling		Large Firm?
Helicopter	Small Firm	Small Firm
Mercury Dry Cell		
Power Steering		
Kodachrome	Small Firm	Large Firm
Air Conditioning	Small Firm	Small Firm
Polaroid Camera	Small Firm	Small Firm
Heterodyne Radio		Small Firm
Ball-Point Pen		
Cellophane		Small Firm?
Tungsten Carbide		
Bakelite	Small Firm	Small Firm
Oxygen Steel Process		

Note: An innovation is the first sale using a discovery. A small firm is defined as having less than 500 employees.

Source: Title and list of inventive contributions from the Charpie Report (U.S. Department of Commerce, "Technological Innovation: Environment and Management," January 1967) pg. 18. Invention and innovation environments compiled by Office of Economic Research, Office of Advocacy, U.S. Small Business Administration, February 10, 1982.

SOME IMPORTANT INNOVATIONS BY U.S. SMALL FIRMS IN THE TWENTIETH CENTURY

Acoustic Suspension Speakers
Air Conditioning
Airplane
Assembly Line
Automatic Fabric Cutting
Automatic Transfer Equipment
Bakelite
Biosynthetic Insulin
CAT Scanner
Catalytic Petroleum Cracking
Continuous Casting
Cotton Picker
Double-Knit Fabric
Electrical Wire Nuts
Fiber Optic Examination Equipment
Geodesic Dome
Gyrocompass
Heart Valve
Heat Sensor
Helicopter
Heterodyne Radio
High Capacity Computer
Hydraulic Brake
Learning Machine
Link Trainer
Optical Scanner

Oral Contraceptives
Outboard Engine
Overnight National Delivery
Personal Computer
Photo Typesetting
Piezo Electrical Devices
Polaroid Camera
Precast Concrete
Prefabricated Housing
Pressure Sensitive Adhesive Tape
Safety Razor
Sonar Fish Monitoring
Strain Gauge
Strobe Lights
Vacuum Tube
Variable Output Transformer
Xerography
Zipper

Note: An innovation is the first sale using a discovery. A small firm is defined as having less than 500 employees.

Source: Compiled by the Office of Economic Research, Office of Advocacy, U.S. Small Business Administration, February 10, 1982.

QUESTIONS SUBMITTED TO DONALD N. LANGENBERG, NATIONAL SCIENCE FOUNDATION

1. Q. Has a formal evaluation of the NSF SBIR program been performed?

A. The Small Business Innovation Research Program (SBIR) funds early stage, high-risk research by small firms through a two-stage competitive solicitation. One major premise of the program is that venture capital is lacking for high technology initiatives. The related hypothesis is that SBIR awards will ultimately "leverage" venture capital, create new jobs, and yield innovative new products and processes.

The NSF Industrial Processes Research (IPR) Section is currently conducting an intramural evaluation study to test this assumption. IPR has selected three groups of firms that participated in the 1977 SBIR Solicitation and are conducting field interviews of researchers in these firms to see what has transpired since 1977. The capital stringency issue is being examined in some detail. One group of 19 firms in the study sample received Phase I awards of $25,000 in 1977 and 9 of these received much larger Phase II awards. A second group of 19 firms was declined support but submitted proposals that were roughly equivalent in peer review scores to the first group. A third group of 19 firms did not receive awards and submitted proposals that were judged lower in merit. Executive officers and related personnel will be interviewed in all of the 57 companies. The NSF objective is to find out in a detailed manner how the SBIR program actually works and what its impact is on innovation and commercialization among SBIR grantees. We expect this evaluation study to be completed in April.

2. Q. Do you think the NSF program is adaptable to other agencies?

A. We do think that it is adaptable. As I mentioned in my testimony, I do not think that the NSF program format can be used by others without any modification. The differences in missions, organization and content of research programs, the methods of selecting projects for mission relevance and quality, and the scheduling of agency program objectives all would have a bearing on how an agency might adapt an SBIR format. We designed our program to fit NSF programs, policies and procedures and to suit the way in which we use the peer review system. If sufficient flexibility is allowed in these matters, I think that other agencies could develop programs using the SBIR concept.

3. Q. How does the SBIR program differ from your other research programs?

A.° NSF's SBIR program is our only research activity in which the research performers are limited to small businesses. In most NSF programs, proposals would be accepted from research performers with any institutional base, though some programs are such that the effect is to favor researchers in academia.

° The SBIR program uses a solicitation, and this is not typical of NSF research programs, most of which respond to unsolicited proposals. Since we use a solicitation, proposals under the SBIR program do not have to be cost-shared by the proposer and it is even possible for the proposer to seek a modest fee.

° The SBIR solicitation places special emphasis on keeping proposals simple and brief in order to minimize differences between those who have extensive experience as compared to those with little experience in proposal preparation.

° The special Phase I step provides a feasibility phase, with certainty on the part of the proposer of the amount that can be expected from NSF if an award is made. This encourages some organizations with innovative ideas to take on the risk of competing. Because the risk factor is well understood by the NSF staff and the Phase I award amounts are modest, NSF staff is likely to fund the extraordinary idea that has a very high element of risk but that might result in a significant breakthrough.

° The SBIR program is designed specifically to encourage actively the movement of research findings into beneficial use.

° The proposals cover a broad range of research topics that are chosen specifically by the NSF program managers as offering opportunities for scientific or technical breakthroughs.

4. Q. Do you currently coordinate with SBA under the SBIR program? Will the required uniformity of the programs, and requirements that agencies coordinate with SBA, constrain agencies' flexibility?

A. Coordination between NSF and SBA has been effected (1), in cosponsoring a series of twice-yearly Federal Briefing Conferences for small high-technology firms on R&D opportunities in the Government and (2), in notification and distribution of the annual SBIR solicitation and other information to small firms around the country. Formulation of topics, evaluation of proposals, and administration of grants are entirely NSF responsibilities. In our view, this relationship has worked well.

SBA has not been involved in the planning of NSF's solicitation time schedule. This has been determined by our funding cycle, and the time required for proposal preparation, review and awards.

From the NSF experience, we see no reason that an agency's flexibility need be constrained by coordinating with SBA on notification and distribution of solicitations. Such coordination has helped NSF implement our program. SBA assistance can serve all participating agencies through timely and up-to-date dissemination of programmatic information, e.g., schedules, mailing lists, solicited technical topics, and awards. Program design and rationale should be handled by the individual agencies. In determining the timing of SBIR solicitations, each agency will be driven in large measure by its funding and program cycles. For many--if not most--agencies, it will be necessary to await final actions by Congress on authorizations and appropriations before issuing solicitations. Time must be allowed for proposal preparation, review, selection and award, usually within the bounds of one fiscal year, at least for Phase I awards. In addition, most agencies other than NSF have program missions that involve time schedules. Since the SBIR programs are intended to further agency research goals, mission schedules would be a determinant also. Thus there is likely to be overlap in time of solicitations from one agency to another, especially under H.R. 4326, which would involve solicitations from thirteen agencies. It seems probable that adding SBA in a coordinating role with respect to scheduling the release of agency solicitations would constrain the agencies considerably.

Concerning uniformity, we have noted in our response to question 2 that there is a need for flexibility in adapting the NSF model to other agencies. We think that SBA might be most helpful in suggesting elements of uniformity among the solicitations of the different agencies. However, we urge that final decisions be left with the agencies, since they must answer for the success of their research programs.

It should be noted that the Administration-supported S.881 requires OSTP and OFPP to establish regulations and procedures for interagency coordination.

5. Q. Can you compare your experience with SBIR proposals in the life sciences against those received in other sciences?

A. In the history of four SBIR solicitations at NSF, 29% of all Phase I awards have been made for projects in the life sciences. Less than 2% are in the social sciences, and the balance, i.e., 69% are in the physical sciences. Since 33% of the topics offered in SBIR solicitations have been specifically designed for the life sciences, the award of grants in this area is roughly commensurate with the emphasis placed on it.

6. Q. Would NSF have trouble meeting the set-aside requirements with a total exemption of basic research funds?

A. If basic research funds were to be totally exempted we might have difficulty at the 3% level, but probably not at the 1% level. In fact, if such an exemption is made, it is probable that the calculation of the base should be restudied.

Based on NSF experience and the impressions of our staff, we think that most proposals under an SBIR program will not be in basic research areas. They will tend to concentrate in applied areas, most especially if SBIR programs or their adaptations maintain NSF's focus on looking for research opportunities that may facilitate the use of research findings to produce technological innovation. A small number of companies say that they want better opportunities to have proposals considered in basic research areas and it would probably be unsound policy to write legislation that would exclude them totally. Therefore, if it is concluded that basic research should be exempted, such provisions should not result in total exclusion.

7. Q. Is the peer review process, utilized at NSF to evaluate proposals, relevant to a program which is geared to commercialization and the marketplace?

A. NSF has extensive experience with peer review as the principal means of evaluating research proposals.

We feel it is the best means for this purpose and that it is compatible with NSF's mission of support for science and engineering research. The relevance of our peer review process to evaluation of product development and marketing may be questioned. However, we do not fund such activities in our SBIR program; we fund only research activities.

We would not presume to conclude that our form of peer review is the one best method for other agencies with other missions. Having said this, we would still recommend that other agencies consider peer review, or some adaptation of it, for use in their SBIR programs. In the programmatic design of SBIR at NSF, the key issue in the evaluation of proposals is the quality of the research, and peer review is highly effective for this purpose.

Commercial potential is raised as a consideration only secondarily. This is handled in two ways: (1) proposals with recognizable commercial potential receive an "extra point of merit" in Phase I competition, and (2) high-quality Phase II proposals receive additional consideration if they can show reasonable follow-on support for Phase III commercial development for third-party private sources. It is only after scientific quality of a proposal is established by peer review that commercialization becomes an issue in evaluation. If the follow-on funding for Phase III can be identified at the time of the Phase II proposal, this is regarded as prime facie evidence of acceptable commercial potential in that it is an independent judgment by an objective third party.

Thus, by SBIR program design, peer review is used to appraise scientific quality, and other more appropriate means are used to gauge commercial potential.

8. Q. What is your experience concerning the number of proposals received from for-profit organizations? (in all areas).

NATIONAL SCIENCE FOUNDATION, DATA ON SMALL BUSINESS RESEARCH PROPOSALS

	Fiscal year—	
	1980	1981
Total research proposals from small business	776	980
SBIR program	530	697
All other areas	246	283
Biological sciences (BBS directorate)	21	48

QUESTIONS SUBMITTED TO STUART EVANS, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

QUESTION H-1:

What type of impact do you expect on your mission as a result of an SBIR program of the magnitude as envisioned under H.R. 4326?

ANSWER H-1:

Should the bill be enacted during Fiscal Year 1982, it would impact the Agency in at least three ways: (1) The funds set aside by the bills provisions would have to be levied from the accounts set forth in the Agency Operating Plan submitted to the Congress on January 21, 1982, thereby reducing allocations set forth in that plan by $29.2 million. In the absence of future authorizations and appropriations for the SBIR program in Fiscal Years 1983 through 1985, further allocations in the approximate amounts of $60 million, $120 million and $180 million, respectively, would be required from otherwise authorized funds in those fiscal years; (2) a progressively increasing range of broad topics for "innovation" potential for commercial oriented application would be required to sustain an annual assistance and stimulation mission; and (3) a new administrative machinery for an expanding grant process would be required at both NASA Headquarters and within the NASA Centers to administer such a program.

QUESTION H-2:

Is the NSF SBIR program presently conducted applicable to your Agency's requirements?

ANSWER H-2:

No it is not. NASA's mission, with the exception of relatively minor assistance under Section 403 of the Space Act, does not embrace a support, stimulation or assistance role of the character of the NSF program. The latter, which is conducted through the award of grants has as its objective the stimulation of innovation in the private sector for commercial purposes; does not involve substantial involvement by the Government and results in no direct benefit to the NSF.

QUESTION H-3:

Could your Agency structure a similar program more appropriate to its specific needs?

ANSWER H-3:

Yes. We would most likely structure such a program from NASA's annual research and technology program under which we manage and control research currently in progress throughout NASA. The research and technology program normally encompasses some seven hundred specific and well defined research objectives being pursued to fulfill NASA requirements. Annually we publish and distribute summaries of these objectives to the SBA and throughout the country to foster interest in Agency research activities and facilitate the submission of proposals for its conduct. Since our research efforts are conducted for the direct benefit of the Government, this is not an assistance program and it is incompatible with the phases defined in H.R. 4326. Both the magnitude and duration of the efforts under the research and technology program are greater than those envisioned in H.R. 4326.

QUESTION H-4:

What is the present level of small business participation in your Agency's operations and how do you see an SBIR program relating to the present day?

ANSWER H-4:

In Fiscal Year 1981, small business participation in NASA's total procurements aggregated some $409 million or 9.6 percent of all prime contracts and some $474.9 million in subcontracts for a total of $884.3 million. This constitutes approximately 20 percent of total contract/subcontract awards to business firms. Of the 100 contracts in FY 1981 receiving the largest dollar value prime contracts, 24 were small business firms.

QUESTION H-5:

From what sources in the authorization and appropriations acts do you see funding for this program being drawn?

ANSWER H-5:

Under NASA's FY 1982 Operating Plan submitted to the Congress on January 21, 1982, there are no line items from which SBIR funds could be drawn without substantial realignment of mission priorities. Of the $5,940 million available, $4,261 million, or 72 percent, is committed to Space Transportation Systems and operations, in-house effort under Research and Program Management, and Construction of Facilities. The remaining $1,679 million, or 28 percent, is equally committed to the continuation, at a substantially reduced rate, of our ongoing aeronautics and space research and development efforts.

QUESTION H-6:

How do the individual funding action amounts suggested for Phases 1 and 2 by the Small Business Committee relate to your experience?

ANSWER H-6:

They do not particularly relate to the manner in which NASA pursues its research efforts. The phases contemplated under the bill, and particularly the first phase, are of relatively short and a low level of effort applied to a broad topic. The results of this type of grant effort appear to be both too broad in scope and shallow in depth to be responsive or meaningful in pursuit of the more specific research objectives NASA presently seeks. Phase II, with its preference to both private capital commitments and commercialization diverges from NASA specific research objectives. Phases in NASA research are more oriented toward milestones accomplishment and objective achievement than to time and funding level.

QUESTION H-7:

How would your Agency coordinate SBIR solicitations with SBA? How would this requirement affect your Agency?

ANSWER H-7:

The House Committee report suggests four such solicitations per year by DoD, two per year by DOE, HHS and NASA, and, inferentially, one annually for the eight other agencies subject to the bill - a potential total of eighteen solicitations per year. The Committee expects the agencies to coordinate such releases amongst themselves and with the SBA. In view of the potential "obligate or lose" provisions of the bill and the procurement cycle involved in identifying research topics, structuring and disseminating soliciting proposals, peer group evaluation, selection and award, there is bound to be clustering of Agency solicitations early in the fiscal year to permit sufficient time to conduct the whole process. Should SBA "coordination" take the form of spreading out solicitations, considerable time and delay in coordination can be anticipated.

QUESTION H-8:

For years NASA has had a large research and technology program. How would an SBIR program affect this effort?

ANSWER H-8:

An SBIR program is bound to impact this process in ways it is presently difficult [illegible] foresee for three reasons: (1) Funds for an SBIR program would to a large extent have to be taken from the research and technology program; (2) if SBIR topics are to be related to NASA's needs, most likely the same sources presently active in the current research and technology program would respond; and (3) if a grant process is employed as contemplated by the House Report, the direct benefits to NASA would be diminished.

QUESTION H-9:

How would the SBIR program of H.R. 4326 impact the present NASA procurement program?

ANSWER H-9:

The SBIR program of H.R. 4326 would impact the present NASA procurement program in three ways: (1) It would require reallocation of funds from present programs to an effort of a different character; (2) it would require some form of "simplified standardized solicitation" and award process applicable to all agencies (including NASA) thereby creating in effect two different procurement processes involving in many cases the same sources; and (3) it would require the creation of an administrative organization and process within the NASA Headquarters and the Centers to administer and report on the program.

QUESTION H-10:

Your statement stresses the grant character of the NSF SBIR program and the fact that H.R. 4326 is largely an extension of this NSF program. Why wouldn't this program work equally well in NASA?

ANSWER H-10:

Until now NASA has not had any significant mission of stimulation, support or assistance such as that under which the NSF conducts its SBIR program. Likewise, NASA currently has no mission to stimulate innovation for the primary purpose of commercialization. NASA's present role in commercialization has been through the medium of technical transfers of previously developed aeronautics and space technology to the private sector for its potential use.

QUESTION H-11:

In data provided to the Committee, you state that the full set-aside percentages of H.R. 4326 would actually amount to 32 percent of all uncommitted funds. Since the bill only mandates a maximum of 3 percent of your Research and Development budget, why this substantial difference?

ANSWER H-11:

The data provided in NASA's letter of January 22, 1982, was based upon the then latest actual figures available in response to the Chairman's letter of November 30, 1981, requesting information concerning the impact of the provisions of H.R. 4326 upon the Agency; H.R. 4326 would, in its fourth year, require a 3 percent set-aside of NASA's "Research and Development budget". However, it requires such a set-aside upon the basis of a gross budget without consideration as to the extent such budget is reasonably available for these purposes. For example, in FY 1980 a total of $5,084,054,000 was appropriated for NASA "Research and Development," exclusive of construction. Of this total, $996,000,000 was for payment of civil service salaries to conduct Agency operations, provide for utilities, necessary travel and similar needs of a like nature inherent in the conduct of Government business and thus not reasonably available for SBIR set-asides. The actual amounts of such appropriations available for placement with the private sector aggregated some $3,572 billion. Of this amount, approximately $2,789 billion was committed to the continued development of programs specifically authorized by this Committee. In effect, using FY 1980 actual data, NASA would have had some $783 million, of a "budget" of $5,084 billion, wherein the provisions of H.R. 4326 SBIR set-aside could reasonably be applied. However, current NASA small business programs amounted to some $301 million of the $783 million reasonably available for this purpose. Since H.R. 4326 makes clear that the effort contemplated therein is distinct from that presently being attained, the levy directed by the bill constitutes not 3 percent but 32 percent of the funds currently available to the Agency for its execution.

QUESTION H:12:

What percentage of NASA Research and Development funds is to go to small business by direct contract? By subcontract?

ANSWER H-12:

In FY 1981 7 percent of NASA Research and Development funds was placed with small business by direct contract and 32 percent by subcontract.

QUESTIONS SUBMITTED TO HILARY RAUCH, DEPARTMENT OF ENERGY

1. Q. What type of impact do you expect on your mission as a result of an SBIR program of the magnitude as envisioned in H.R. 4326?

A. An SBIR Program conducted at three percent (approximately $139 million) is incompatible with the types of nuclear and defense oriented, high risk, high payoff, long term R&D requirements of the Department. In nuclear fission, fusion and defense weaponry R&D activities, for example, the opportunities for small business participation are constrained. By contrast, total R&D Fiscal Year 1982 budget authority for solar and fossil energy, technologies offering greater small business opportunities, represents only 14.6 percent ($675.4 million) of total departmental R&D. In this connection, however, it should also be pointed out that the latter category will decrease to 4.5 percent ($177.1 million) in our proposed Fiscal Year 1983 budget.

In Fiscal Year 1981, the most recent period for which detailed information is available, the Department's small business share of R&D obligations [exclusive of Government-Owned, Contractor Operated (GOCO) facilities, interagency transfers, and Federal assistance such as loans, loan guarantees, grants, cooperative agreements and interagency transfers] was 5.6 percent, almost two percentage points higher than that achieved governmentwide. Nonetheless, the three percent level of SBIR funding contemplated in H.R. 4326 is nearly twice the level of DOE's total Fiscal Year 1981 small business R&D obligations.

In the table below, estimates are given for SBIR awards through three percent, the maximum level in H.R. 4326 associated with SBIR programmatic obligations. A figure of $4,634 million was used for the Department of Energy's (DOE's) total research and development (R&D) obligations for Fiscal Year 1982. (This does not include funds for capital equipment or construction).

Full Year after Enactment	Percentage	Estimated SBIR Awards in $ Millions
1	.5	23.2
2	1.0	46.3
3	2.0	92.7
4	3.0	139.0

In contrast, DOE would experience no adverse impact from the program level that would result from enactment of S. 881.

2. Q. Is the NSF SBIR program [as] presently conducted applicable to your agency's requirements?

A. NSF's SBIR Program does not fit DOE's programmatic environment. The National Science Foundation's (NSF's) SBIR Program objectives stress research as a base for near-term commercialization through new or improved products, processes, or services. As a continuation of research supported by NSF in SBIR Phases I and II, commercialization is the end product of follow-on private sector funding in Phase III. As earlier stated, DOE has discontinued its direct support for energy technology commercialization and is emphasizing long-term, high risk, potentially high payoff, energy technology R&D.

3. Q. Could your agency structure a similar program more appropriate to its specific needs?

A. Yes, DOE could structure an SBIR program better suited to its needs. Legislation should be sufficiently flexible to accommodate varying agency missions. In this context, S. 881 contains elements suited to restructuring an SBIR to an agency's requirements, such as:

A. Funds for intramural research and development conducted by Federal employees are exempt from the base available for SBIR funding.

B. The Schmitt Amendment caps at one percent those obligations available from basic research monies and GOCO facilities.

C. S. 881 provides flexibility on peer review of SBIR proposals.

The extensive use of GOCO facilities for nuclear and weapons R&D by the DOE is a particular concern. The Department conducts a multiplicity of operations through 32 laboratories--12 multiprogram and 20 program-dedicated. Three multiprogram laboratories are primarily dedicated to weapons R&D (Lawrence Livermore, Los Alamos, and Sandia National Laboratories). In view of the highly classified, capital intensive, specialized nature of such facilities, contribution of nuclear and weapon R&D funding toward an SBIR Program deserves close examination. We would expect that the deliberative regulatory process of any SBIR legislation would take account of agency-specific missions and circumstances.

4. Q. What is the present level of small business participation in your agency's operations and how do you see an SBIR program relating to the present day?

A. In Fiscal Year 1981, the level of small business participation is shown below and further delineated by prime and subcontract elements.

FY 1981 ($ in millions)*

Total (All Sectors)	$9,570
Total Small Business	$1,872
Prime Contracts	368
Subcontracts	1,504
Total Disadvantaged SB	$ 232
8(a)	92
Direct, Non 8(a)	18
Subcontracts	122

Of $1.872 billion awarded to small businesses, $368 million represents small business prime contracts. R&D small business prime contracts were $72.9 million or 19.8 percent of total small business awards. In terms of Fiscal Year 1981 outlays for small business R&D, SBIR awards at the three percent level would represent almost twice Fiscal Year 1981 small business R&D at the Department. As earlier stated in the Department's testimony before the Committee on Science and Technology and in response to Question #1, we find these levels to be incompatible with the small business resource base available to perform high quality R&D, for the Department, especially in its nuclear and defense programs.

* Excludes Interagency Transfers, foreign contracts, oil, utilities, Federal Supply Schedule orders, personal services, and purchases under $10,000.

SBIR Awards Under HR 4326

Full Year after Enactment	Percentage	Estimated SBIR Awards for FY 1982
1	.5	$23.2 million
2	1.0	46.3 million
3	2.0	92.7 million
4	3.0	139.0 million

A figure of $4,634 million was used for the DOE total research and development budget for Fiscal Year 1982. (This does not include funds for capital equipment or construction.)

5. Q. From what sources in the authorization and appropriations acts do you see funding being drawn?

A. In Fiscal Year 1982, the Department is operating under two authorizations, Public Law 97-35, the Omnibus Budget Reconciliation Act, 2nd Public Law 97-90, the DOE FY 1982 National Security Programs Authorization, and two appropriations acts, Public Law 97-88, Energy and Water Development Appropriations, and Public Law 97-100, Interior and Related Agencies Appropriations.

Funds for an SBIR Program presumably would be derived from all R&D sources in the Department. These sources are as follows:

FY 1982 Obligations
($ in Millions)

Basic Research	Total $647.00
Energy Supply R&D	228.50
Fossil Energy R&D	10.10
General Science and Research	408.00
Uranium Enrichment	.40
Applied Research	Total $933.90
Atomic Energy Defense Activities	197.10
Energy Conservation	7.80
Energy Supply R&D	606.70
Fossil Energy R&D	101.60
General Science and Research	19.00
Uranium Enrichment	1.70
Development	Total $3,053.1
Atomic Energy Defense Activities	1,306.9
Energy Conservation	138.3
Energy Supply R&D	1,138.8
Fossil Energy R&D	315.6
Uranium Enrichment	153.5

6. Q. How do the individual funding action amounts suggested for Phases I and II by the Small Business Committee relate to your experience?

A. In H. Report No. 97-349, Part I, funding amounts are suggested for Phases I and II:

> "The most scientifically feasible proposals would be awarded small grants ($30,000-$50,000) in Phase I to fund a feasibility research or R&D effort. Those projects judged most promising in the first phase could then qualify for a second phase of funding (which currently ranges from $100,000-$500,000)."

Although we are not presently conducting an SBIR phased program of the type described in H.R. 4326, experience suggests that a maximum of $50,000 at Phase I may be inadequate. For example, our records for R&D unsolicited proposals show that in Fiscal Year 1981, 1,359 proposals were received for R&D subject areas. Of that number, 205, or only 15 percent, were for $50,000 or less. Further, 23 percent were funded at $50,000 or below.

If Phase II performance falls within the parameters of one to two years, funding between $100,000-$500,000 appears realistic.

7. Q. How would your agency coordinate SBIR solicitations with SBA? How would this requirement affect your agency?

A. The DOE would advise the SBA whenever a solicitation is being prepared. This information would include, but not be limited to, such items as anticipated date of publication, closing date, and technical subjects for which proposals are requested. Since SBA is a non-technical agency, we anticipate that our coordination will be limited to scheduling and other administrative notifications. We would also use SBA's assistance in identifying and locating small business sources for specific R&D procurement requirements. Coordination beyond these ministerial areas would be neither appropriate nor productive.

8. Q. The DOE's R&D budget reflects a 16 percent decrease in 1982 over 1981 in current dollars. More cuts are expected, particularly in areas which would appear most suitable for small business participation. What implications does the budget picture hold for an SBIR program at DOE?

A. If the SBIR Program were enacted at levels dictated in S. 881, the Department's SBIR Program would complement existing practices; if enacted at levels dictated in HR 4326, the SBIR program would require insufficient allocation of scarce resources.

For example, the Fiscal Year 1983 requested budget authority for solar R&D is only $73.0 million as compared to obligations of $248.1 million in Fiscal Year 1982 and $495.6 million in Fiscal Year 1981. Similarly, the fossil energy research and development Fiscal Year 1983 budget authority requested is $104.1 million as compared to obligations of $427.3 million in Fiscal Year 1982 and $639.2 in Fiscal Year 1981. These reductions over a 2-year period drastically reduce the base from which we could expect to fund a large portion of our SBIR activity. The cuts in budget requests for energy R&D are indeed coming from what have traditionally been the more susceptible program areas for small business awards and may result in funding of lesser quality proposals in order to meet the mandated percentages.

9. Q. How much of DOE's R&D is performed at GOCOs? Under S. 881, only 1 percent of GOCO funds may apply to an agency's total 1 percent set-aside. How will this effect DOE?

A. In Fiscal Year 1982, DOE R&D measured in operating expense dollars, is projected to be \$4.634 billion. Of this amount, 67 percent, or \$3.101 billion, is expected to be performed at GOCO facilities.

Assume that in Fiscal Year 1982, 1 percent of the GOCO R&D funds of \$3.101 billion will be used as our base. This gives a maximum of \$31 million which can be taken from the GOCOs, one percent of the remainder of our R&D base (\$1.504 billion) would be \$15 million. Thus, it means that the largest share of dollars would come from funds budgeted for R&D programs in GOCO facilities.

10. Q. On page 5 of your testimony, you indicate you do not ordinarily receive a high number of small dollar proposals in many of your research activities. What do you mean by this?

A. In the area of unsolicited proposals for R&D, our records indicate that in Fiscal Year 1981, we received 1,359 proposals. Of that number, 205 or 15 percent were for \$50,000 or less. Of the total of 359 funded, 84 (23 percent) were for \$50,000 or less. There is no available evidence that solicited R&D proposals by small businesses are lower in their total dollar amount.

11. Q. Please provide a listing of all DOE GOCO facilities (list by name and location.

A. Enclosed is a copy of a publication entitled "Capsule Review of the DOE Research and Development and Field Facilities." This document not only lists the GOCO facilities, but also includes the DOE Field Operations and Project Offices, Government-operated laboratories and engineering and production facilities throughout the United States.

[NOTE.—The document Capsule Review of the DOE Research and Development and Field Facilities is available in the Committee files.]

12. Q. In both H.R. 4326 and S. 881, present agency small business funding agreements may not count toward the percentage set-aside. What dollar amount do these separate agreements represent in FY 1982 appropriations (or FY 1981, if FY 1982 figures are not available)? Do these separate agreements relate to the goaling programs mentioned on page 3 of the appendix to your testimony?

A. In Fiscal Year 1980, the Department's small business share of R&D obligations (exclusive of GOCOs, interagency transfers, and Federal assistance such as loan guarantees cooperative agreements and grants) was 9.6 percent ($125.3 million), the highest level in the Federal Government and more than twice the average percentage achieved throughout the Government. In Fiscal Year 1981, comparable figures were 5.6 percent and $72.89 million. Again, DOE exceeded the average percentage achieved throughout the Government.

The above figures represent that portion of our total SB achievements which were R&D obligations against Public Law 95-507 goals; however, it should be emphasized that Public Law 95-507 does not require DOE to establish goals for R&D.

13. Q. Please provide, in tabular form, the following information in terms of FY 1982 appropriations:

A. a. DOE intramural operating expense R&D obligations: $361 million

b. DOE extramural operating expense R&D obligations: $4,273 million

c. DOE extramural operating expense R&D in basic research (break out this amount by university and industry research);

Basic research by colleges and universities	$556 million
Basic research by industry	83 million
Total Basic Research	$639 million

d. DOE extramural operating expense R&D at GOCO facilities $3,101 million

All numbers are estimates based on R&D reports generated by the DOE.

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QUESTIONS SUBMITTED TO HENRY G. KIRSCHENMANN, JR., DEPARTMENT OF HEALTH AND HUMAN SERVICES

1. "What type of impact do you expect on your mission as a result of an SBIR program of the magnitude as envisioned under H.R. 4326?"

The 3 percent set aside requirement which H.R. 4326 stipulates could have a serious negative impact on the mission of the NIH. While the NIH believes that it will be able to absorb the 1 percent set aside required by the Senate Bill (S. 881) without serious dislocation, the agency doubts that the small business community can provide a sufficient number of high quality, innovative proposals relevant to the agency's main biomedical research priorities and to the proposed SBIR program to justify a 3 percent set aside. As a consequence, a considerable portion of its appropriation may be lost while, at the same time that it will be unable to fund many meritorious applications from the non-profit sector.

The NIH bases this assessment on its knowledge of present known interest and expertise in the small business sector and on the unlikelihood that a sufficient portion of the NIH requirements lend themselves to SBIR initiatives. A major portion of the NIH mission still requires investment in basic research of the type which has no immediate or apparent commercial end product and which small businesses have little other incentive or experience to undertake.

2. "Is the NSF SBIR program presently conducted applicable to your agency's requirements?"

The present SBIR program of the NSF has only partial relevance to the NIH requirements. While almost any small, high technology firm has potential for funding by the NSF because of the very wide scope of the NSF mandate, the much more directed nature of the NIH mission narrows the field considerably. Much of the present activity between the small business community and the NIH is in the area of support and services of the type which lend themselves infrequently to innovative research with quick market potential. The degree to which these biomedically oriented firms are able to change direction quickly remains to be seen, as does the degree to which more research-oriented small businesses emerge (e.g., recombinant DNA firms).

3. "Could your agency structure a similar program more appropriate to its specific needs?"

Because of the major differences between the missions of the NIH and the NSF, the NIH could, like other mission-oriented agencies, design similar programs more appropriate to its specific needs. For example, a longer duration of the phases than used by NSF seems worthy of consideration.

4. "What is the present level of small business participation in your agency's operations and how do you see an SBIR program relating to the present day?"

In the areas of R&D and R&D support, the small business community received funding from the NIH at the level of about $36 million for Fiscal Year 1981. Small portions of this funding were the result of special initiatives for small business, 8(a) and women-owned firms. The major share has resulted from open competition. Subcontracts account for additional participation (approximately

$14.6 million for Fiscal Year 1981). H.R. 4326 stipulates that none of these ongoing initiatives may be counted toward the proposed set aside. As a consequence, the NIH is expected to continue these initiatives and to mount the additional ones specified by the proposed SBIR program. Recent budgetary restrictions have forced selective retrenchments at the NIH, including the contract programs which now are funded at a level of about $100 million less than three years ago. Now, however, the recent opening of grants to for-profit firms, along with recent contractions in contract dollars and the proposed SBIR set asides, will present the NIH with a series of major changes, the consequences of which are impossible to predict with much confidence. Of considerable importance will be how the small business community, itself, will be able to respond to these changes.

5. "From what sources in the authorization and appropriations acts do you see funding for this program being drawn?"

   Every appropriation currently with authorization to sponsor research projects will be a potential source of funding for the SBIR program.

6. "How do the individual funding action amounts suggested for Phases 1 and 2 by the Small Business Committee relate to your experiences?"

   As noted in the HHS statement before the House Committee on Science and Technology, the initial response to the SBIR program in the field of biomedical research may be relatively sparse — in part because of the funding amounts suggested for phases 1 and 2. Examples are two fields which lend themselves to obvious commercial potential — drug development and genetic engineering. The first requires very large capital outlays; the second demanded huge initial investments before any potential commercialization could be considered. On the other hand, commercialization of cell fusion (hybridoma) research was clearly obvious shortly after Dr. Milstein's initial discovery.

   Since the NIH has no experience in a program such as SBIR, it can only attempt to learn to identify additional areas of this type and hope that the small business community can be responsive.

7. "How would your agency coordinate SBIR solicitations with SBA? "How could this requirement affect your agency?"

   The NIH has worked with SBA over the years on its set aside initiatives for small and 8(a) firms. If the SBA is to play a major role in the SBIR program, the NIH recommends that the SBA permit sufficient latitude in how the NIH will announce and process the SBIR initiatives. The NIH expects to utilize its peer review system for the evaluation of responses of applicants. The SBA could play a major and important role in assessing the corporate status of these applicants. If the NIH and the SBA can agree on major policies and procedures, following which event the NIH will be free to proceed with the SBIR initiatives, few problems are likely to occur. Major and/or detailed and continuing oversight by the SBA of the SBIR program at the NIH could cause an administrative overlay which might impede seriously NIH's efforts to provide the prompt types of announcements, responses and adjustments which the SBIR program will require.

8. "In what areas are the 77 small business firms currently holding NIH contracts primarily represented?" "What currently limits their participation?"

Principal areas in which small businesses (77 during Fiscal Year 1980 and 88 during Fiscal Year 1981) participate in NIH activities are as follows:

Chemical & Drug Synthesis
Drug Testing (non-human)
Development and Testing of Instruments and Devices
Preparation and Evaluation of Biomaterials
Clinical Laboratory Services
Preparation and Study of Microbiological Materials
Pathology Services
Animal Production
Communication Services
Program Support
Evaluation Studies
Coordination and Support of Clinical Trials

Since the majority of this participation by small businesses was the result of open competition, the lack of small business activity in other areas is due to lack of requisite facilities and/or expertise in some (e.g., clinical research and trials) or expertise not of the quality to win an award in open competition.

9. "How many small business firms do you expect will be able to respond to the program presented, in areas relevant to NIH?" "What areas or research will most likely be funded under this system?"

The NIH is unable to anticipate what type of response it will receive initially from the small business community on the SBIR program. Over the years the NIH has received many unsolicited proposals and letters from small businesses which outline ideas for which funding is requested. Many of these have little relevance to the NIH mission. Review of many others has indicated a serious lack of scientific rationale. As a consequence, at the outset of SBIR program, the NIH would propose to establish clear guidelines regarding applications in order to discourage the submission of proposals clearly not relevant either to the NIH mission or to the intent of the SBIR program. This would help to prevent overloading the review bodies with applications of little or no merit and wasted time in the preparation of such applications.

Initial areas most likely to be funded are those in which the small business community already has demonstrated capabilities (see response to question 8).

10. "Do you believe that small business firms have any advantages over large business or academia in areas of R&D of interest to NIH?"

A number of such advantages have been evident in the past. Any future ones are highly dependent on how the small business community is able to respond to the SBIR program.

Several years ago, when the NIH began its period of rapid growth, a number of small businesses, mostly in the greater Washington, D.C. area, started up and also enjoyed a period of expansion — in some cases to the extent that, through growth and/or acquisiton by or of other firms, many are no longer small businesses. While these events may have been due, to some extent, to propinquity, they also demonstrated a response to a manifest need by close monitoring of the direction of biomedical research and providing needed ingredients. This demonstrated capability to be flexible in response may be the principal advantaged which these firms have over large businesses and academia.

11. "Is the 3 phase format for funding appropriate for the kinds of research likely to be supported by NIH?"

    The 3-phase format will be appropriate for a number of the R&D areas supported by the NIH but not for others in which certain required basic research has no immediate applicability to the expertise of small businesses or to the intent of the SBIR program.

12. "To what do you attribute the NSF's experience in receiving so few proposals in the genetic engineering area?" Do you believe the same experience may apply to other research areas NIH supports?"

    During the past few years genetic engineering has been an exciting and popular field which has commanded a large dollar outlay by the NIH because of the immense potential of the work. The leaders in the field where able to obtain support from the NIH and those who were successful in developing ideas with commercial potential were able to gain venture capital without going through the NSF SBIR program. The small size of the NSF awards, compared to the cost of basic research in genetic engineering, may also have been a discouraging factor. This same experience may apply to other areas, particularly in the drug development field where large capital expenditures are required to carry a drug from initial testing, to final FDA approval and sale for clinical use.

13. "Are all research proposals approved under peer review process funded?" "What percentaged of approved proposals receive funds?"

    (a) No.
    (b) For Fiscal Year 1981 the award rate for research project applications was 39.2 percent.

14. "What is the average grant cycle of a NIH research?" What portion of each year's appropriations are uncommitted?"

    (a) The average approved period for research project grants in Fiscal Year 1981 was 3.33 years.

    (b) Fiscal Year 1981 commitments as percent of total:

All research grants	76%
Research project grants	70%

15. What percentage of HHS R&D funds go to small business by direct contract? By subcontract?

    In Fiscal Year 1981 the NIH awarded R&D contracts totaling $369,151,000. Direct awards to small businesses totaled $36,223,572 or 10 percent; subcontract awards to small businesses totaled $14,553,273 or 3.9 percent.

Questions Submitted to Morton A. Myers, General Accounting Office

1. Does the three-phase design of the NSF program recognize the differences in agency missions?

The three-phase design of the NSF SBIR program provides for the changing support requirements of firms engaged in each of the three stages of the innovation process--invention, development, and commercialization. Both H.R. 4326 and S. 881 propose this three-phase approach. The first phase of support would provide funds to investigate an idea's technical feasibility, an activity that corresponds to the invention stage in the innovation process. The second phase would provide funds to develop and explore the concepts determined to be technically feasible in phase one. The third phase, moving the invention into commercialization, would encourage third-party follow-on funding to commercialize the results of inventive and developmental activities. Each of these stages is generic to innovation, regardless of where SBIR programs may be housed.

2. Should there be greater flexibility of approach given the different agency missions and operating styles of the various agencies?

Both H.R. 4326 and S. 881 prescribe SBIR programs that are sufficiently flexible to accommodate different agency missions and styles by allowing a variety of possible approaches during implementation. For instance, agencies are free to choose research topics to be included in SBIR program solicitations and agencies are free to develop evaluation criteria for judging proposals submitted under SBIR program solicitations. The bills specify only broad guidelines for agencies to follow in developing SBIR programs and would not prevent individual agencies from modifying the program to suit particular circumstances.

3. The small business share of Federal R&D has frequently been cited at 3-1/2 - 4%. Do you believe this is accurate? Does this figure include subcontract data?

While the percentages you state are those frequently cited, I do not have sufficient information to confirm or refute their precision. I would point out that such statistics are usually heavily dependent on the definitions in use when compiling such data.

While I believe that the share of Federal R&D going to small businesses is an area in need of clarification and further study, it is my view that compilation of accurate statistics is likely to be hampered for two reasons. First is the absence of the use of a standard definition of small business and differences in activities classified as research and development. Second is that data on R&D performed through grants or through contracts under $10,000 are incomplete. However, preliminary analysis of available data suggests that small businesses receive between 3-8 percent of Federal R&D funds for prime contracts over $10,000.

4. A December 1981 study performed by GAO found that small businesses are more inventive but not necessarily more innovative than large companies. What does this say about the bills presently under consideration?

Our December 1981 study did conclude that small firms had been more active as inventors than as innovators--actually bringing an invention to the market--it did not compare the activities of small businesses with those of large businesses. Our conclusion, stated another way, simply acknowledges that small firms play a different role in each of the three stages of the innovation process--invention, development, and commercialization--and that their level of participation in the first two stages might be expected to be greater than in the final commercialization stage. The changing nature of small firms' activities in innovation depends more on the nature of the markets in which they must compete and the amount of capital necessary to produce and distribute new products than on any quality inherent to small businesses.

It is our judgment that the phased-approach employed by both H.R. 4326 and S. 881 recognizes and accommodates the changing roles of small firms in the innovation process and thus will help to strengthen and foster the activities of small businesses in innovation.

APPENDIX IV

WITNESS BIOGRAPHIES

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON D C 20500

DENIS J. PRAGER
Biographical Data

Denis J. Prager received his B.E.E. (Electrical Engineering) in 1962 from the University of Cincinnati. From 1962 to 1965 he worked at the National Institutes of Health designing and developing microanalytical instruments and methodologies for biomedical research. He was commissioned as an officer in the United States Public Health Service in 1960. In 1968, Prager received his Ph.D. in physiology from Stanford University where he conducted research on immunologic reactions and electrophysiology of the cardiovascular system.

Dr. Prager returned to the National Institutes of Health in 1969 as Chief of the Contraceptive Development Branch, Center for Population Research, where he served as director of a new Federal program in reproductive biology and fertility control method development.

From 1970 to 1976, as Director of the Battelle Population Study Center, Seattle, Washington, Dr. Prager established and directed an international population research program. In 1976, Dr. Prager became Corporate Research Fellow and Associate Director for Program Development for the Battelle Memorial Institute, Seattle, Washington. Concurrent with his work at Battelle, Dr. Prager was Affiliate Associate Professor, School of Public Health, University of Washington, Seattle.

In 1978, Dr. Prager joined the Office of Science and Technology Policy (OSTP), in the Executive Office of the President. In April 1980, Dr. Prager was appointed an OSTP Associate Director, responsible for the formulation, analysis, and implementation of science and technology policies related to health, biomedical research, regulatory science, agriculture, human nutrition, international health, and issues at the interfaces between government, universities, and industry. Dr. Prager also serves as Executive Secretary, Federal Coordinating Council for Science, Engineering, and Technology.

Dr. Prager is the author or co-author of more than 30 articles in professional journals. He has also served as the editor of several scientific books in the fields of population, family planning, research, and education.

NATIONAL SCIENCE FOUNDATION
WASHINGTON D C 20550

DONALD N. LANGENBERG
Deputy Director

Donald N. Langenberg was born March 17, 1932 in Devils Lake, North Dakota. He received his undergraduate education at Iowa State University, received the M.S. degree from the University of California, Los Angeles, and the Ph.D. degree from the University of California, Berkeley.

He joined the faculty of the University of Pennsylvania in 1960, where since 1967 he has been Professor of Physics. He currently also holds a secondary appointment as Professor of Electrical Engineering and Science.

Dr. Langenberg is married to the former Patricia Warrington, who is Assistant Professor of Statistics at Temple University. They have four children: Karen, 25, graduate student in physiology, University of Pennsylvania; Julie, 23, student in the School of Veterinary Medicine, University of Pennsylvania; John, 18, student at Yale University; Amy, 16, student at Lower Merion High School, Ardmore, Pennsylvania.

Dr. Langenberg's field is experimental condensed matter physics and materials science. His earliest research was concerned with the electronic properties and Fermi surfaces of metals and semiconductors. A major part of his research career has been devoted to the study of the phenomenon of superconductivity, particularly the Josephson effect and nonequilibrium superconductivity. He is perhaps best known for his work on the determination of certain fundamental physical constants using the AC Josephson effect. One of the consequences of this work was the development of a new type of voltage standard which has been officially adopted by the United States and by other nations. Dr. Langenberg is the author or co-author of approximately one hundred scientific articles and has edited several books.

Dr. Langenberg has held predoctoral and postdoctoral fellowships from the National Science Foundation, the Alfred P. Sloan Foundation, and the John Simon Guggenheim Foundation. In 1975, he was awarded the John Price Wetherill Medal of the Franklin Institute. He has been a visiting professor or researcher at Oxford University, the Ecole Normale Superieure, the California Institute of Technology, and the Technische Universitat Muchen.

At the University of Pennsylvania, Dr. Langenberg has served as Associate Chairman for Undergraduate Affairs of the Department of Physics, Director of the Laboratory for Research on the Structure of Matter, and Vice Provost for Graduate Studies and Research. He has been Chairman of the Division of Condensed Matter Physics of the American Physical Society and is Chairman-Elect of Section B (Physics) of the American Association for the Advancement of Science. He has served as an advisor or consultant to a variety of universities and government agencies. He has been Chairman of the National Science Foundation Advisory Council and a member of the Board of Trustees of Associated Universities, Inc., of the Council on Governmental Relations, and of the National Commission on Research.

Since July, 1980, Dr. Langenberg has been Deputy Director of the National Science Foundation. He also served as Acting Director until December, 1980.

December 1980

U.S. Department of Energy
Speakers Bureau
Office of Public Affairs
Washington, D.C. 20585
202-252-5641

BIOGRAPHY

HILARY J. RAUCH

Hilary J. Rauch is Director, Procurement and Assistance Management, U.S. Department of Energy (DOE). Mr. Rauch was appointed to this position in July 1980 under the predecessor office of Procurement and Contracts Management Directorate. In this capacity, he serves as the principal adviser on procurement contracts and business agreements. He also oversees the negotiation and administration of contracts, grants, cooperative agreements, and loan guarantees and is responsible for small and minority business procurement. He had served as Deputy Director since the creation of DOE in October 1977.

Mr. Rauch has served approximately 20 years with the Federal Government since active military duty. Over fifteen of those years have been in procurement, mostly research, development, and demonstration, with the U.S. Energy Research and Development Administration and the U.S. Atomic Energy Commission (AEC), a predecessor of DOE. His assignments, which have been in areas of policy, operations, and management, have been in the field and in Washington, D.C.

Before joining the AEC, Mr. Rauch was a Budget Examiner covering Federal science activities at the Bureau of the Budget (now OMB), Executive Office of the President. He served in the U.S. Navy for five years on active duty and remained in the U.S. Naval Reserve (USNR) for 16 years, retiring from the USNR with the rank of Commander in 1976.

Mr. Rauch was awarded a B.A. degree in Economics from the University of Notre Dame in 1954 and did graduate work in mathemical economics at the University of California at Berkeley in 1959.

In 1980, Mr. Rauch received a Presidential Meritorious Executive rank award for sustained superior accomplishment in the management of Federal energy programs, and in 1981 he was awarded the Department's Oustanding Service Medal for his achievements as Director of Procurement and Assistance Management.

Born in South Bend, Indiana, Mr. Rauch currently resides in Olney, Maryland. He is married to Lois Jane Rollins and has two children John & Delinda.

June 1981

BIOGRAPHICAL SKETCH

Mr. Henry G. Kirschenmann, Jr. is the Deputy Assistant Secretary for Procurement, Assistance and Logistics in the Department of Health and Human Services. As such he is one of the Department's chief career officials and advisors to the Office of the Secretary in the grant and procurement area.

Prior to being appointed to his current position, Mr. Kirschenmann served in various financial management positions in the Department and at the National Institutes of Health. He was involved in developing and implementing cost policy and other financial management policy for colleges and universities and other non-profit organizations, State and local governments and hospitals which receive grants and contracts from the Department. He was also involved in establishing indirect cost rates. Mr. Kirschenmann has served with the Defense Contract Audit Agency, was a staff member of the national accounting firm of Price Waterhouse and Company, and has held various positions in industry.

He holds a Bachelor's Degree from the University of Maryland, a Master's Degree from The American University and is a certified public accountant. He is the recipient of Senior Executive Performance Award, the Department of Health, and Human Service's Superior Service Award, and two achievement awards and the President's Citation from the Association of Government Accountants.

January 1982

Morton A. Myers
U.S. General Accounting Office

Morton A. Myers is Director, Program Analysis Division. He also coordinates GAO activities with the Office of Technology Assessment and provides staff assistance in support of the Comptroller General's responsibilities as a member of the OTA Advisory Council.

Mr. Myers received a bachelor of science degree with a major in accounting from Quinnipiac College in 1961. He attended the George Washington Graduate School of Business, and in 1969-70, was a graduate fellow at the University of California under the Federal Government's education program in systems analysis.

Previous GAO positions held by Mr. Myers included Assistant Director, Office of Policy and Special Studies; Assistant Director, Civil Division; Assistant Director, Manpower and Welfare Division; Deputy Director, Procurement and Systems Acquisition Division; and Deputy Director, Program Analysis Division.

Mr. Myers is a member of the American Association for the Advancement of Science; the National Association of Accountants; The Association of Government Accountants; and the Phi Theta Kappa National Honorary Society. In 1970, he received the GAO Special Education Award; in 1972 and 1973, the GAO Meritorious Service Awards; and in 1981, Senior Executive Service Performance Award.

Dr. Myron Tribus is currently Director, Center for Advanced Engineering Study, Massachusetts Institute of Technology. He was formerly Senior Vice President for Research and Engineering at Xerox, where he was responsible for the R.D.&E. of the entire line of copiers, duplicators and telecopiers. Before that he served for two years as Assistant Secretary for Science and Technology in the Department of Commerce. He was for eight years Dean of the Thayer School of Engineering at Dartmouth College.

Dr. Tribus has published over 100 papers on topics ranging from academic topics such as heat transfer, thermodynamics, probability, decision theory, and fluid mechanics to applied topics such as aircraft de-icing, air conditioning, sea water demineralization, reliability engineering and design. He has also published and lectured on technology in public policy, engineering education for public service, and the position of U.S. technology in world trade.

Dr. Tribus is a member of the National Academy of Engineering and was Chairman of its Committee on Public Engineering Policy (COPEP).

He has served on several boards of directors and has been consultant to many corporations and agencies of government. He is on the Board of Governors of the Technion, Haifa, Israel.

Dr. Tribus holds the PhD from UCLA, has received two honorary doctorates and five awards for technical papers and public service. He is 55, married and has two daughters, 16 and 20.

BIOGRAPHICAL SKETCH

Kenneth W. Chilton is Associate Director of the Center for the Study of American Business at Washington University in St. Louis, Missouri. He has been with the Center since 1977. Prior to his employment at Washington University, he held a variety of positions in the private sector -- engineer and management science consultant in the aircraft industry, director of planning and treasurer with a home furnishings manufacturer. He owned and operated a small business for a short period of time prior to joining Washington University.

Mr. Chilton's research interest, in the broadest sense, is the proper role for business and government in America. More specifically, he has focused on the effects that government regulation (federal and state) are having on the business system.

Mr. Chilton has published several reports and spoken to numerous audiences about federal regulation, particularly with regard to its impact on small firms and innovation. He and Murray L. Weidenbaum prepared a report entitled Federal Government Regulation and Small Business Performance for the Small Business Administration in 1979. A follow-on report "Government Regulation: The Small Business Burden," is forthcoming in the Journal of Small Business Management. In addition, the Center published his report entitled, "Big Government and Small Business: the Changing Relationship" (with David P. Hatfield) in October of 1981.

Mr. Chilton's research has also focused on innovation and technological change. He teamed with Murray L. Weidenbaum in 1978 to write "All Hazards Are Not Equal" for the July/August issue of The Sciences. "Innovation: A Victim of the Rush to Regulate" was published in November 1981 in Los Angeles Business and Economics, and in December of 1980, Mr. Chilton addressed the Fourth Annual Forum on Jobs, Money and People on "Improving the Innovative Climate: The Need for Regulatory Reform."

NEWS RELEASE
Association of American Medical Colleges

FOR RELEASE: A.M., November 3, 1981

CONTACT: Charles Fentress
(202) 828-0455

OLIVER SELECTED AAMC CHAIRMAN

Washington, D.C., November 3 -- Thomas K. Oliver, Jr., M.D., chairman of the Department of Pediatrics at the University of Pittsburgh School of Medicine, was installed today as chairman of the Association of American Medical Colleges (AAMC) at the organization's 92nd Annual Meeting held here.

He succeeds Julius R. Krevans, M.D., dean of the UC-San Francisco School of Medicine. John A.D. Cooper, M.D., Ph.D., is full-time president of the Association.

Oliver will head the AAMC Assembly, which oversees the activities of the three councils and one organization that govern the prestigious Association. They are the Council of Deans, representing all 126 schools, the Council of Teaching Hospitals, the Council of Academic Societies, and the Organization of Student Representatives.

Oliver has been active in medical education affairs at the national level for a number of years, serving as chairman of the Council of Academic Societies and as a member of the Executive Council of the AAMC. He is currently serving as chairman of the Accreditation Council for Graduate Medical Education.

Referring to issues of concern to the Association, Oliver said that because of cutbacks in student loans and in service alternatives such as the National Health Service Corps, "medical schools are in grave danger of becoming elitist institutions for the wealthy." Another issue, he said, was the impact of medical student indebtedness: "The present Federal policy is shortsighted and potentially very hazardous to the quality of health care we know today."

"Finally," Oliver said, "the Association and its constituency must begin to address issues such as how to work productively with industry without losing the virtues of academia such as free exchange of ideas and open disclosure of findings; and how to reduce health care costs and how to set priorities in education, care, and research to assure we do the best job possible with the limited resources available to us."

A graduate of Harvard Medical School, Oliver began his distinguished academic career at Cornell University College of Medicine in 1954, joining the Department of Pediatrics at Ohio State University a year later. For seven years he served as associate professor and later as professor in the Department of Pediatrics at the University of Washington School of Medicine. He has been chairman of the Department of Pediatrics at the University of Pittsburgh since 1970, serving from 1970-78 as medical director of the Children's Hospital of Pittsburgh.

Oliver has served on the boards and committees of numerous national societies and organizations, including the American Academy of Pediatrics, American Board of Pediatrics, American Thoracic Society, and the Institute of Medicine. He was chairman of the Editorial Board of Pediatrics in 1969-74.

RANDY KNAPP **RESUME OF QUALIFICATIONS**

SUMMARY OF QUALIFICATIONS

Possess several years successful experience in Executive Level Management environments. Background includes the following:

Complete financial and operational management responsibilities...Marketing plan development, implementation and coordination...Selection/training of key management personnel...Facilities planning...Long and short range planning...profit planning...New product development...Emphasis in Quality Control...Policy/procedure development and implementation...

Am able to work across and with multiple organizational lines for planning, implementing, and results measuring...sound analyzer, problem solver and troubleshooter...possess a successful record of accomplishments in each position held with am emphasis on improvement in total operation, sales, profits, and return on investment...

Am profit and people minded, relate well at all levels, and am strong in ability to analyze, develop and direct imaginative and innovative timed progress to achieve results ...self-starter...Motivator...

PROFESSIONAL EXPERIENCE

1975 to Present — WESPERCORP
President/Chairman of the Board — Anaheim, California
Chief Executive Officer (Co-Founder)

As Chief Executive Officer, exercise full management authority over all phases and aspects of the business that includes Engineering, Manufacturing, Sales/Marketing, and financial and administrative management.

Scope of responsibility includes the selection of key management personnel, develop and implement financial plans and controls, develop and implement sound operating plans/policies and procedures, work in close liaison with Engineering, Manufacturing, Research, New Product Development personnel, assist in the development of marketing strategies, analyze market potentials/trends, perform customer/client relations functions with key accounts, and am involved with all other financial and operations management functions.

Have been instrumental in developing this company to where sales exceeded 5.6 million dollars in 1978.

1972 to 1975 — DATUM INCORPORATED
Division Manager - PED — Anaheim, California
General Manager - PDC

Served as Product Line Manager with full profit and loss responsibility for both

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PROFESSIONAL EXPERIENCE (Continued)

the Peripheral Equipment Division, and the Peripheral Dynamics Corporation Division. Products for which I was responsible included magnetic tape and cassette systems for the OEM market, and cassette systems for the end-user market.

Scope of responsibility included product development/research and development, prototype fabrication coordination, capital equipment procurement relative to the manufacture of these product lines, marketing plan development, production start-up, applications engineering in conjunction with key OEM's, and general administrative management functions.

Was instrumental in increasing sales by 2.4 million as compared with sales from previous fiscal periods.

1970 to 1972 MSI DATA CORPORATION
Director of Engineering Product Planning Irvine, California

Served as Director of Engineering Product Planning with full market research and engineering development responsibility for the "ASTROS" point-of-sale systems, primarily developed for the supermarket industry. Performed similar functions as those described above (Datum, Inc.).

1968 to 1972 INVECOM SYSTEMS INC.
Vice President - Marketing Sunnydale, California
Co-Founder

Assisted in co-founding this firm, and performed all product inventions and development functions (electronics inventory tracking devices and semi-conductor manufacturing equipment product lines). After initial start-up, served as Vice President of Marketing responsible for development and implementing market penetration programs.

Prior

- Regional Applications Engineer 1967 to 1968 — MOXON ELECTRONICS CORPORATION, San Mateo, California
- Project Liaison Coordinator 1962 to 1967 — UNIVERSITY OF CALIFORNIA LAWRENCE RADIATION LABORATORY (Nevada test site)
- Quality Assurance Engineer 1961 to 1962 — LOCKHEED AIRCRAFT CORPORATION, Sunnyvale, California

EDUCATION

- College of San Mateo; San Mateo, California
  Graduate - Business Management Programs
  GPA 3.9 of 4.0

- Pierce College; Los Angeles, California
  Major: Physics

- Lockheed; Sunnyvale, California
  Technical Program in Electronic Engineering

PROFESSIONAL ASSOCIATIONS

- Small Business Committee of American Electronics Association (A.E.A.)
- Orange County Steering Committee of American Electronics Association (A.E.A.)
- Advisory Member of the Board of Directors of Datasystems Corporation of San Diego
- Member - National Independent Businessmen Association
- Member - National Business Aircraft Association

CIVIC ASSOCIATIONS

- Past Advisory Member of Clark County Nevada Board of Education
- Past Director of Sports Car Club of America
- Member - 552 Club - Hoag Memorial Hospital (Volunteer Work)

PERSONAL

- Born 7-16-37
- Married...2 Children
- Excellent Health

REFERENCES

Excellent personal and professional references available upon request.

ANN ESKESEN

Currently Director, Small Business Resource Development Center, Bentley College, Waltham, MA. Formerly founder President GROWING CONCERNS, a research and consulting firm specializing in the start-up, early stage growth problems of technology-based firms, and has also owned two other small firms.

An elected delegate to the White House Conference on Small Business, January 1980, Ms. Eskesen chairs the Small Business Advisory Board of U.S. Senator Paul Tsongas and serves on the boards of U.S. Senator John Chaffee, U.S. Representative Nicholas Marvoulas and Massachusetts Governor Edward King. She is chair of the SBANE Innovations Committee and serves on the board of a number of small business firms.

Formerly on the faculty at Bentley College, Ms. Eskesen has also taught at SUNY Albany and Russell Sage in Troy, NY. She has a BA, Keele, England 1964, MA, Albany, 1975 and is a Ph.D. candidate (on leave) from SUNY Albany.

She is married with two sons, living in Swampscott, MA having emigrated to the United Stated from England in 1967.

January 1982

Stanley I. Mason, Jr.
Curriculum Vitae

Stanley I. Mason, Jr.
President and Chief Executive
Born: August 18, 1921

Education:

B.S Education, Science, English, Industrial Arts--N.J. State, Trenton, New Jersey.

Credits toward MBA, Rollins College, Winter Park, Florida.

School of Fine and Industrial Arts, Trenton, New Jersey. Six years Special Program.

Military:

Pilot, U.S. Air Force, 1943-1946
Air Inspector for Tng. and Opns.

Professional Experience:

February 1973-Present Simco, Incorporated, President and Chief Executive: Develops new patentable products, concepts, prosesses for large industrial companies; and Simco proprietary portfolio. Consists of a group of professional business managers, technologists, product designers, engineers loosely organized to supply (from the outside) the entrepreneurial thrust and creative thinking to complex, highly structured, consumer and industrial companies.

Serve such clients as:

American Can Company: American Consumer Products Company-includes Dixie Cup, Butterick Patterns, Marathon paper products, Aurora and Northern Tissue. Develop new products, from concept through manufacturing and marketing.

S.C. Johnson & Sons, Inc.: Johnson's Wax. Explore new product needs, search for market vacuums, lead marketing research, packaging design and graphics, training; market test and product introduction; evaluation of new company candidates for acquisition, recommend to management.

Hunt-Wesson Foods, Division of Norton Simon, Incorporated,: Develop management goals, directions for development of new product specifications and objectives for future. Lead joint program with Research & Development and Marketing managements.

Rexham, Inc.: A paper-board, plastic film, rigid plastic; drug, food and fashion packaging manufacturer. Solve special process and machine problems-new product development; advisor to managers and Chairman of the Board.

Cooke & Castle, Inc.: Dole pineapple, bananas, steel, land, leisure time, housing. New Product Development support; organizational planning; marketing research, inventing and developing new packages for current and new products.

Nestle, Inc.: Foods, candy. Develop new product lines.

Frito-Lay Corp.: Develop unique packaging system, new product development.

Johnson & Johnson & Company: Surgikos Division-Develop proprietary packaging systems and new products in disposable hospital operating packs Health Care Division-Develop new concepts for product line revision. Personal Products-New packaging, Dispensing systems.

Simco, Inc.: Development and marketing of a number of proprietary inventions. Also lead in the formation, staffing and directing of several other interests of Simco, including the Green Earth Division and the Electronic Systems Division, Masonware Corporation.

June 1967-
February 1973

American Can Company
Manufactures and markets all types of packaging: plastic, film, paperboard and metal. In consumer area, paper-based products-tissue, napkins, Dixie Cups, dress patterns.

Vice President, Products Development, Technical and Creative Services: Directed all creative functions of packaging business, 500 people, 5 departments: Product and Commerical Development, Advertising and Sales Promotion, Marketing Research, Technical Services, Products and Customer Graphics-Design

Directed 325-man Tech Service Department and its three-major, seven-branch laboratories from traditional manufacturing orientation, toward marketing and customer/consumer responsiveness.

Developed program of world-wide surveillance, seeking innovations. Negotiated contracts with inventors, consultants, research organizations for rights, licenses, patents; led such products through throes of commercialization.

1967-1969 American Can Co.

Vice President, Product Development; promoted from Director, Product Planning. Directed Product Development, Marketing Research. Reoriented technical research groups away from traditionsl and safe line-extension projects, toward consumer-responsive "market vacuum" programs.

Designed and patented revolutionary new disposable diaper after perceiving life-style trends and confirming judgment by marketing research. Optimized design, machine and materials used, created unique packaging, minimizing cost and maximizing TV and shelf-appeal.

1958-1967 Hunt Food & Industries (now Norton Simon, Inc.)

Director, Packaging Development; Organized and directed all company packaging activities. Balanced needs of marketing, manufacturing, R&D, as they related to products to be packaged. Developed cost, lead time, machinery feasibility for all innovations and new products.

Directed total packaging design of all Company's food, match, paint products. Analyzed consumer/trade, price/cost, value profiles. Designed 19 packages and products; many patented and on supermarket shelves.

Manager of Creative Services; Creative member of three-man management team directing ad agency's program, strategy, tactics, copy objectives, platforms and budgets. Supervised and produced all Hunt/Wesson in-store and sales promotion collateral.

Creation and management of Recipe Test/ Concept Kitchens to develop ads, recipes, and new concepts.

Assistant to Executive V.P. and General Manager; Recommended organization plan; developed standards for employee selection/ performance. Spearheaded nationwide executive searech program.

1946-1947, 1948-1959, 1953-1958
(Seven years)

The Martion Company, Baltimore, MD., Orlando, FLA; Aircraft, Missles, electronics.

Manager, Presentations Department, Orlando, Fla.(1957-1958) Created all the selling, marketing materials; trained engineers to present/sell-unique marketing concept developed in Martion to help technical people communicate the complexities/value of their products to non-technical customers.

Was promoted from Baltimore headquarters to Orlando, where small team bought land, built factory, office buildings, set up business and facilities for 8,000 future employees.

Assistant Manager; Martin's Headquarters Presentation Department. (1955-1957)

Art Director of 50 artists and technical illustrators, Chief Editor of 30 writers. Responsible for successful sales, presentations of Vanguard Earth Satellite, Titan, Seamaster, and later, Bullpup and LaCrosse.

Advertising Coordinator; Developed new corporated ad series. (1953-1955)

Assistant to Training Director; Created management development program. (1948-1949)

Senior Training Instructor; Wrote Management Newspaper. (1946-1947)

1949-1953

Delkote, Inc., Wilmington, Delaware. A small research organization, manufacturers of plastic adhesives, lacquer finishes.

Director, Marketing and Sales; Built new company which grew to $1 million sales. Supplied marketing know-how, and built network of national distributors, salesmen.

1947-1948

Armstrong Cork Company, Lancaster, Pa. (linoleum, building materials, gaskets)

Advertising Copywriter; Prepared ad copy for 17 industrial products; produced folders, direct mail, dealer helps, displays, sample kits.

1958-1967

Consultant: Marketing, Communications, Graphics

Orange County Illustrated, Newport Beach, CA
Ryan Aircraft, San Diego, CA
Andre Reichel Associates, La Habra, CA

BIOGRAPHY OF ARTHUR S. OBERMAYER

EDUCATION:

- Swarthmore College:
  B.S. (High Honors), 1952
  Alumni Council, 1963-1966
- Massachusetts Institute of Technology:
  Ph.D. Chemistry, 1956
  National Science Foundation Fellow, 1953-1956
  Overseas Summer Fellow, 1953
  Alumni Council, 1974-Present

BUSINESS:

- Moleculon Research Corporation, President, Chairman of the Board, 1961-Present
- American Association of Small Research Companies, Vice President, 1972-Present
- Research Management Association, Founder and First Chairman, 1963-1969
- Smaller Business Association of New England, Director, 1971-1974
- Boston Industrial Mission, Director, 1972-1975
- Strem Chemical, Inc., Director, 1969-Present
- Ercon, Inc., Director, 1968-1974
- Zero Stage Capital Co., Chairman of the Board, 1981-Present

PROFESSIONAL:

- Association of Technical Professionals, President, 1971-1978
- Federation of American Scientists, Treasurer 1971-1974
- National Council for Small Business Innovation, Chairman, 1980
- American Chemical Society:
  Division of Small Chemical Businesses, Executive Committee, 1979-1980
  Northeastern Section, Chairman, 1982
  Northeastern Section, Program Committee, Chairman, 1981

GOVERNMENT:

- White House Conference on Small Business Delegate representing Speaker O'Neill, 1980
- Congressional Office of Technology Assessment:
  Panel on Applications of Science and Technology, 1974-1978
  Task Force on Appropriate Technology, 1976-1979
- National Science Foundation:
  Experimental Research and Development Incentives Program, Advisory Panel, 1973-1976
  Advisory Council, 1980-Present (Steering Committee 1981-Present)

GOVERNMENT, cont'd:

- International Conference on Innovation, The Hague, U.S. Delegate, 1978
- Commonwealth of Massachusetts:
  - Governor's Management Task Force, Board of Directors, 1975-1978
  - State Manpower Planning Council, 1971-1974
- U.S. Senate Small Business Committee, National Advisory Council, 1981-Present
- Small Business Administration, Innovation Advocate of the Year, 1981
- Small Business Administration, Task Force on Innovation and Technology, 1978-1979
- Witness, numerous Congressional hearings on patents, innovation, science, economic conversion, small business, technology transfer, government procurement, and employment.

ADDRESS:

- Business: 139 Main Street, Cambridge, MA 02142
  (617) 547-2353
- Home: 239 Chestnut Street, West Newton, MA 02165
  (617) 244-2398

APPENDIX V

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230

March 18, 1982

RECEIVED

Honorable Don Fuqua
Chairman, Committee on Science
and Technology
U.S. House of Representatives
Suite 2321 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your request for the views of the Department on H.R. 4326, the Small Business Innovation Development Act.

The bill would amend the Small Business Act to strengthen the role of the small, innovative firms in federally funded research and development, and use Federal research and development as a base for technological innovation to meet agency needs and contribute to the Nation's economy. Specifically, this bill requires that each Federal agency with a research and development budget of over $100 million per year set aside three percent of its budget to support small business innovation research (SBIR) programs.

The Department strongly supports efforts that increase small business participation in Federally sponsored innovation research, a principal objective of H.R. 4326. It is important to this Department and to the Administration that efforts to assist small business are encouraged.

As you have requested, we have reviewed both H.R. 4326 and S. 881. The Department prefers the Senate bill to the House version. The President expressed his support for the Senate bill in his October 6, 1981 letter to Senator Rudman.

H.R. 4326 would establish a SBIR program activity in an amount based on a percentage of the agency's total available obligation for research or research and development. S. 881 is more acceptable because the amount to be established for the SBIR effectively would be limited to a percentage of that portion of the agency's research and development funds for research expenditures outside the Federal Government. The preponderance of our research and development projects are in-house. For example, the National Bureau of Standards (NBS), one of the Department's largest research and development operating units, performs more than 90 percent of its activities in-house. H.R. 4326 would require that NBS reallocate an unrealistic amount of its budget to SBIR activities, which could disrupt fulfillment of necessary in-house research. Since S. 881 exempts in-house research from the calculation, we would have no objection to its enactment, and would support its goals to ensure that small firms are able to participate equitably in Federal research and development.

A number of ongoing activities within the Department are indicative of our concern for small business. The Department administers its small business procurement responsibilities through the Office of Small and Disadvantaged Business Utilization. We have met our small and disadvantaged business goaling requirements, established pursuant to P.L. 95-507, for the last two years. We expect to meet our FY 82 goal which will result in 35 percent of all procurement in the Department being designated for small business.

In addition to the Department-wide management of small business procurement, each bureau within Commerce has established practices to assist small business. Through the International Trade Administration, we conduct 15 or 20 procurement fairs on export issues and export availability. The Department also publishes the Commerce Business Daily (CBD), which particularly benefits small business as it publicizes pertinent information on the approximately 110 billion dollar per annum U.S. procurement system. The CBD is coded to indicate which procurement items are covered fully or in part under small business set asides.

Recently, to help small business, we established a regulatory relief telephone "hotline". This is a toll free telephone staffed by the Department. It is an effort to provide small business an opportunity to give advice to the government on regulations they believe need attention. Our regulatory staff channels this information to the appropriate agency and to the President's Task Force on Regulatory Relief.

The Minority Business Development Agency in the Department has a mandate to develop and coordinate a national program for minority business enterprise. Management and technical assistance is provided to minority enterprises, many of which are small businesses, primarily through a network of local business development organizations. Centers are also funded which assist minority firms in the commercialization of new technologies.

The Department would need to increase its administrative resources to implement either bill. We cannot accurately estimate the personnel resources and organizational structure that would be needed. We can assume that the Department will use the current organizational structure that is in place to comply with either bill. Clearly H.R. 4326 would require a larger number of positions and funds because it would establish a much larger SBIR program effort than would S. 881.

We have been advised by the Office of Management and Budget that there is no objection to the submission of this letter to the Congress from the standpoint of the Administration's program.

Sincerely,

Sherman E. Unger

Sherman E. Unger
General Counsel

GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
WASHINGTON D.C. 20301

January 27, 1982

Honorable Don Fuqua
Chairman, Committee on
Science and Technology
House of Representatives
Washington, D. C. 20510

RECEIVED
FEB — [illegible]
COMMITTEE ON SCIENCE
AND TECHNOLOGY

Dear Mr. Chairman:

We appreciate this opportunity to provide our views and comments regarding H.R. 4326, the Small Business Innovation Development Act 1981 and S. 881, the Small Business Innovation Research Act 1981.

The Department of Defense strongly supports the position the President has taken in lending his assistance to the passage of S. 881 as the Defense Department owes much of its success in military research and development advancement to the efforts of small high technology firms. We are therefore in complete accord with the objectives of both of these bills "to strengthen the role of small innovative firms in federally funded research and development and to utilize federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the nation's economy."

While these bills are similar in many respects, there are several significant differences, critical to the Department of Defense, which requires us to support S. 881 over H.R. 4326. Permit me to address our concerns regarding these differences as follows:

S. 881 requires, after the second year of the bill's passage and after application of a formula, that an agency make available for a Small Business Innovative Research (SBIR) Program approximately 1% of its R&D expenditures with profit and non-profit entities outside the Federal government. Conversely, H.R. 4326 would require each agency after the third year of the bill's passage, to budget 3% of its research and development budget in support of an SBIR program. We do not support this provision of H.R. 4326 for two reasons. First, it uses an agency's overall R&D budget as a base to compute the amount to be made available for the SBIR program. This approach fails to recognize that much of the DoD R&D budget is spent for in-house R&D mission support which offers little or no opportunity for outside contracting. For example, the Armament Division of the Air Force Systems Command is primarily funded with R&D money. This includes civilian salaries and the major portion of the operation and maintenance of test ranges. Second, we believe the final figure of 3% to be excessively high. If this figure were to be applied to DoD for FY 1982, this would amount to $642 million. We do not believe, with some conviction, that there are a sufficient number of capable and innovative small firms to absorb this volume of highly complex and technical R&D requirements. By FY 1985, this figure could be increased to almost $900 million. This is further evidenced by the fact that in FY 1981 DoD awarded $679 million to this nation's small research firms much of which was for R&D awards that were not as innovative nor as complex as the R&D project areas that are and would be involved in an SBIR program. This factor can be considered from another point of view. The SBIR program can be considered as a "Small Business R&D Set-Aside Program." In this regard, DoD in FY 1981 made $74.5 million in small business R&D set-aside awards. To make $642 million in SBIR set-aside awards would be over an 800% increase over our FY 1981 performance. To mandate a 3% figure would force the agencies into selecting SBIR subjects of questionable relative-worth as related to their mission responsibilities. Accordingly, we support S. 881 as it takes a much more realistic approach regarding these considerations.

S. 881 requires the Small Business Administration (SBA) to independently review agencies' annual reports on SBIR program implementation whereas H.R. 4326 requires SBA to independently survey and monitor the operation of SBIR programs within participating Federal agencies. We would suggest that SBA is neither staffed, trained nor possesses the expertise required to perform independently the "survey and monitor" function. Therefore, we believe the S. 881 approach of having SBA "review" the agencies' reports and having the Office of Science and Technology to independently survey and monitor the operation of the SBIR programs is the proper assignment of responsibilities.

S. 881 charges the Office of Federal Procurement Policy (OFPP) to issue policy directives for the general conduct of SBIR programs within the Federal Government whereas H.R. 4326 assigns this responsibility to the SBA. In view of OFPP's responsibility to establish Federal-wide procurement policy, we favor S. 881 over H.R. 4326 in this regard.

S. 881 provides flexibility regarding outside peer review of SBIR proposals. H.R. 4326, however, mandates outside peer review unless national security or intelligence functions clearly would be jeopardized. We believe Federal agencies require the flexibility afforded by S. 881. There will be many cases where the best qualified individuals to evaluate SBIR proposals are the very ones which identified the need and established the specific SBIR subject on which proposals would be sought. Therefore, we support S. 881 in this regard.

In accordance with your request we have enclosed copies of our testimony before the Senate Small Business Committee on S. 881 and before the House Small Business Committee on H.R. 4326.

Your letter requests a brief description of our existing practices for complying with all applicable statutes relating to small business. Our small business program is established as per the requirements set forth in the Small Business Act and further implemented by the Defense Acquisition Regulations. These regulations establish the policies and procedures to be followed by all DoD commanders, program managers, contracting officers, and Small and Disadvantaged Business Specialists. The DoD Director of Small and Disadvantaged Business Utilization reports directly to the Deputy Secretary of Defense as required by Public Law 95-507. The DoD employs approximately 700 Small and Disadvantaged Business Utilization Specialists (SADBUS) who report to the commanding officers of their military purchasing activities. The SADBUS serve as small business advocates within the activities and advise technical and contracting personnel regarding small business sources and set-asides, section 8(a) and subcontracting program requirements. These personnel receive training in small business program requirements. In addition, small business contracting goals are established annually for these activities. Each military department has a Director of Small and Disadvantaged Business Utilization who oversees the performance of the SADBUS and the activities' performance in meeting their annual program goals.

We also conduct a very comprehensive program to reach as many small R&D firms as possible in order to capture the benefits of their imaginative and innovative capability. This outreach program includes:

(1) Providing R&D procurement information to all segments of the business community;

(2) Providing counseling to business persons on an individual basis as well as at Federal procurement conferences sponsored by the members of Congress in their local constituencies;

(3) Appointment of small business technical advisors who are assigned to our laboratories and provide assistance to the small business technical entrepreneur who is seeking assistance from a technical rather than a procurement standpoint;

(4) The fourth aspect of our outreach program is in keeping with the objectives of H.R. 4326 and S. 881 to establish an agency SBIR program. Our conviction of the soundness of the SBIR program approach is evidenced by the fact that we initiated the development of an almost identifical program 18 months ago.

Our Defense Small Business Advanced Technology (DESAT) Program is being conducted in three phases:

- Phase I

  20 R&D project areas (100 contracts to be awarded) Awards up to $50,000 each.

- Phase II

  Advanced development contracts awards up to $500,000 each.

- Phase III

Follow-on production awards, where appropriate and/or commercial application of the product or service developed as a result of this program. Commercial application would be funded with private venture capital.

Our Defense Small Business Advanced Technology Program generated 1103 proposals in September, 1981. Twenty research and development project areas of particular interest to the Army, Navy, Air Force and Defense Advanced Research Projects Agency were identified for the exclusive participation of small high technology firms. One hundred contract award winners were announced by Secretary of Defense Weinberger on December 23, 1981.

There are several other aspects associated with our outreach program which are of importance which are also enclosed.

The estimated administrative and budgetary costs by fiscal year, for H.R. 4326 and S. 881 are reflected in the table below:

	1982	1983	1984	1985	Total
		(Dollars In Millions)			
Administrative					
H.R. 4326	4.0	9.3	20.7	34.4	68.4
S. 881	1.4	4.1	8.1	9.0	22.6
Budgetary					
H.R. 4326	97.1	228.6	514.2	848.1	1,688.0
S. 881	30.4	107.5	201.6	221.4	560.9

Our experience indicates that implementation of H.R. 4326 or S. 881 can not be accomplished without modification of existing procedures and will require additional personnel and other associated overhead expenses.

It should be noted that the costs associated with H.R. 4326 are significantly higher than with S. 881. Because of these increased costs, the reduced agency flexibility in carrying out its R&D mission and the possibility of being required to make SBIR awards for the primary reason of attaining a mandated SBIR goal, we do not support passage of H.R. 4326. These shortcomings are not associated with S. 881. Therefore, the Department of Defense wholeheartedly supports the President in his views that S. 881 will enhance the opportunities for scientifically oriented small business firms to be able to participate equitably in Federal research and development.

Sincerely,

William H. Taft, IV

Bidders Mailing List

The DoD is involved in several actions in order to assist the small R&D firm. One is to get the "word" out to the small R&D businessperson as to how to do business with DoD, which DoD activities purchase what kinds of R&D and whom small firms can contract for assistance. The key to increasing awards to small R&D firms is the assurance that an increased number of small firms can be expected to bid on DoD R&D procurements. This can be enhanced by having as many small firms as possible make application to be included in the Bidder's Mailing List of DoD procuring activities.

Federal Procurement Conferences

DoD is also actively engaged with the Department of Commerce in supporting the Federal Procurement Conferences which are sponsored by individual members of Congress in their local districts or states. At each of these conferences, DoD provides a senior Small Business Advisor from one of the Military Services or the Defense Logistics Agency as well as other DoD representatives from DoD activities located in the proximity of the Congressional member's constituency.

Attachment

These DoD personnel provide information on how to do business with the military. Businesspersons are given copies of the booklet "Selling to the Military" which tells them what products and services each of our activities buys and what procedures must be followed in order to be placed on our bidders' mailing list. This publication also includes a separate section on Research and Development listing our R&D activities, what they buy, and how to prepare an unsolicited proposal. DoD also publishes a booklet listing each of our approximately 700 Small and Disadvantaged Business Specialists by their assigned procurement activity and location. These individuals not only assist businesspersons desiring to obtain procurements but more important, they screen procurements over $2,500 to determine if they can be set-aside for exclusive small business participation. Additionally, all of the Military Services distribute publications which treat their requirements in greater detail.

DoD Technical Advisors

A specific senior technical individual at each of the DoD laboratories has been assigned, as one of his duties, to help small business obtain research and development contracts. Individuals so assigned work with the small business specialists in terms of offering advice on R&D matters, such as identifying the particular engineer who is most familiar with a forthcoming R&D procurement. This is part of our continuing effort to involve technical personnel in the small business program.

Commerce Business Daily Synopsis

Forthcoming procurement requirements valued in excess of $10,000 are synopsized in the Commerce Business Daily (CBD). Notices are also published of every contract award valued in excess of $100,000, which provides small firms the opportunity to compete for subcontract awards.

R&D Information

The Military Services conduct advanced planning briefings for industry to inform them of what products, services or techniques will be sought in the near future. The Navy has established two NARDIC's (Navy R&D Information Center), one on each coast which includes Air Force representation. These offices makes information regarding R&D planning and requirements available to small business. The Navy has also established a NICRAD (Navy/Industry Cooperative R&D) Program which furnishes scientific and technical information on the operational capabilities and requirements of the U.S. Navy to non-government activities on a cooperative, no cost contract basis.

R&D Sources Sought

It is DoD policy to utilize the R&D Sources Sought Section of the Commerce Business Daily, whenever practical, to seek additional small business sources for R&D procurements anywhere from three to six months in advance of the actual procurement.

This technique is particularly helpful to small business firms. It gives them an opportunity to respond, by submitting technically qualifying information, to any synopsis in which they have an interest and a capability to satisfy.

Technology Transfer

It is the policy of the DoD to promote military-civilian technology transfer and cooperative development. This policy encompasses (1) the transfer of technology developed by DoD activities for national defense purposes to the civilian sector where such technology can be profitably utilized for non-military applications, and (2) the identification of coming technologies of both military and civilian interest and the exploration of the feasibility for cooperative funding and for development of such technologies.

We accomplish this primarily through our Defense Technical Information Center (DTIC). DTIC assists these Government contractors -- and potential Defense contractors -- by supplying technical reports of completed R&D efforts as well as summaries of ongoing R&D projects. These services are available to all U.S. Government activities and to their contractors, subcontractors and grantees -- regardless of size.

The systematic and timely availability of these technical reports and current project summaries helps significantly to prevent or reduce unnecessary duplication of R&D project work and to accelerate the completion and application of research information in order to shorten the "concept-to-delivery" cycle.

The DTIC technical document collection totals more than a million different titles, covering all areas of science and technology. Information in these reports can enhance the effort of aerodynamicists, chemists, mechanical engineers, psychologists, ecologists, or any other person with the Federal R&D community.

There are thousands of summaries in the Center's Work Unit Information System which answer the who, what, when, where and how concerning ongoing, Defense-sponsored, R&D efforts. Included is a narrative description of each effort, its purpose, costs and the activities responsible (with names and telephone numbers of key personnel).

Organizations registered with DTIC have access to a variety of products and services. Most of these services are provided free of charge, while very nominal fees are imposed on others.

DTIC receives all Defense-related reports with classifications ranging from unclassified to Secret and Restricted Data; however, not all reports are processed at this facility. DTOC's responsibility includes the processing, announcing, storing, and distributing of classified and unclassified/limited Defense reports to National Technical Information Service (NTIS), Department of Commerce

STATEMENT

ON THE

S. 881

BY

MR. ROBERT F. TRIMBLE
DEPUTY UNDER SECRETARY OF DEFENSE
FOR RESEARCH AND ENGINEERING
(ACQUISITION POLICY)

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE,

I AM BOB TRIMBLE, I SERVE AS THE DEPUTY UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING, (ACQUISITION POLICY) AND WELCOME THIS OPPORTUNITY TO APPEAR BEFORE YOUR COMMITTEE TO EXPLAIN OUR SMALL BUSINESS RESEARCH AND DEVELOPMENT PROGRAM AND COMMENT ON S. 881 WHICH INTENDS TO STRENGTHEN THE ROLE OF SMALL R&D FIRMS TO MEET AGENCY NEEDS AND TO CONTRIBUTE TO THE GROWTH AND STRENGTHENING OF THE NATION'S ECONOMY.

I HAVE WITH ME MRS. NORMA B. LEFTWICH WHO IS THE DOD DIRECTOR OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION AND MR. HAL C. FLESHER WHO IS THE DIRECTOR FOR SMALL BUSINESS AND ECONOMIC UTILIZATION POLICY.

IN FY 1980 THE DOD HAD ONE OF ITS MOST SUCCESSFUL YEARS IN THE HISTORY OF ITS SMALL BUSINESS AND DISADVANTAGED BUSINESS PROGRAMS. PERFORMANCE IMPROVED IN ALL FIVE DISCRETE ELEMENTS BY WHICH WE MEASURE OUR OVERALL PROGRAM EFFECTIVENESS. INITIALLY, I WOULD LIKE TO TOUCH BRIEFLY ON FOUR OF THESE ELEMENTS TO SHOW HOW THE DOD HAS BEEN SUPPORTING THIS NATION'S SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS CONCERNS AND SPEAK IN A LITTLE MORE DETAIL ABOUT THE PROPOSED LEGISLATION AND HOW THE DOD IS ASSISTING THE SMALL R&D BUSINESS COMMUNITY.

1. PRIME CONTRACTING

IN FY 1980 WE AWARDED 20.4% OF ALL OF OUR PRIME CONTRACT AWARDS TO SMALL BUSINESS. THIS LEVEL OF 20.4% RANKS AMONG THE HIGHEST LEVELS WE HAVE ACHIEVED IN THE HISTORY OF OUR SMALL BUSINESS PROGRAM DATING BACK TO 1953. IT SHOULD BE NOTED THAT OUR PRIME CONTRACT DOLLAR AWARDS TO SMALL BUSINESS ROSE SIGNIFICANTLY BY $1.4 BILLION FROM $12.2 BILLION IN FY 1979 TO $13.6 BILLION IN FY 1980. THIS REPRESENTS THE HIGHEST DOLLAR AMOUNT THAT WE HAVE EVER AWARDED TO THE SMALL BUSINESS COMMUNITY.

2. SET-ASIDE AWARDS

SET-ASIDE AWARDS WHICH ARE RESTRICTED TO SMALL BUSINESS FIRMS, AND WHICH HISTORICALLY HAVE AVERAGED APPROXIMATELY 5.4%, ROSE FROM 7.0% IN FY 1979 TO 7.2% IN FY 1980. THE DOLLAR VALUE OF THESE AWARDS INCREASED FROM $4.1 BILLION TO $4.8 BILLION FOR AN INCREASE OF $700 MILLION. THIS ACHIEVEMENT IS THE HIGHEST LEVEL OF SET-ASIDES EVER ATTAINED IN THE HISTORY OF THE SMALL BUSINESS PROGRAM.

3. SUBCONTRACT AWARDS

OUR SUBCONTRACT AWARDS TO SMALL BUSINESS SIGNIFICANTLY INCREASED FROM $9.1 BILLION OR 40.8% IN FY 1979 TO $10.8 BILLION OR 42.4% IN FY 1980. THIS LARGE INCREASE OF $1.7 BILLION REPRESENTS A

19% IMPROVEMENT OVER LAST YEAR'S PERFORMANCE, AND IS NEXT TO THE HIGHEST LEVEL RATE OF PARTICIPATION OF SMALL BUSINESS SUBCONTRACTING AND THE HIGHEST AMOUNT OF DOLLARS AWARDED SINCE THE INCEPTION OF THE SMALL BUSINESS SUBCONTRACTING PROGRAM IN 1961.

4. SMALL DISADVANTAGED BUSINESS AWARDS

FY 1980 SMALL DISADVANTAGED BUSINESS AWARDS FOR PRIME CONTRACTS, SUBCONTRACTS, AND SECTION 8(A) AWARDS REACHED ANOTHER ALL TIME HIGH INCREASING FROM $1.25 BILLION IN FY 1979 TO $1.66 BILLION IN FY 1980. THIS INCREASE OF $406 MILLION TO $1.66 BILLION REPRESENTS A 32% IMPROVEMENT OVER DOD'S FY 1979 PERFORMANCE.

ENCLOSURE ONE THROUGH FOUR SHOW OUR SPECIFIC PERFORMANCE IN THESE AREAS OF PERFORMANCE MEASUREMENT.

S. 881

I WOULD NOW LIKE TO TURN TO S. 881. WE HAVE MADE A COMPREHENSIVE REVIEW OF THIS PROPOSED LEGISLATION AND COMPLETELY SUPPORT ITS OBJECTIVES TO: (1) STIMULATE TECHNOLOGICAL INNOVATIONS; (2) USE SMALL BUSINESSES TO MEET FEDERAL R&D NEEDS AND (3) INCREASE PRIVATE SECTOR COMMERCIALIZATION OF INNOVATIONS DERIVED FROM FEDERAL R&D. HOWEVER, WE OPPOSE CERTAIN PROVISIONS IN THE BILL DESIGNED TO ACHIEVE THESE OBJECTIVES. LET ME BE SPECIFIC.

SECTION (4)(F) OF THIS BILL WOULD REQUIRE EACH FEDERAL AGENCY, WHICH HAS A RESEARCH OR RESEARCH AND DEVELOPMENT BUDGET IN EXCESS OF $100 MILLION, TO ESTABLISH A SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM REQUIRING AN AGENCY TO EXPEND NOT LESS THAN TWO TENTHS OF 1 PERCENTUM OF FY 1983, AND NOT LESS THAN 1 PERCENTUM OF BUDGET FOR ALL SUBSEQUENT FISCAL YEARS WITH SMALL BUSINESS CONCERNS SPECIFICALLY IN CONNECTION WITH A SBIR PROGRAM.

WE SUPPORT THE ESTABLISHMENT OF A MULTI-AGENCY SBIR PILOT PROGRAM WITH THE PARTICIPATING AGENCIES TO BE DESIGNATED BY THE PRESIDENT. BY CONDUCTING THIS PROGRAM ON A PILOT BASIS, IT WILL ENABLE US TO TEST THE CONCEPT, IDENTIFY WHAT PROBLEMS MAY BE INVOLVED AND DETERMINE WHETHER TO ESTABLISH THE PROGRAM ON A PERMANENT BASIS.

WE OPPOSE MANDATORY QUOTAS FOR SMALL BUSINESS R&D CONTRACT AWARDS. TO ARBITRARILY ESTABLISH A MANDATORY QUOTA DOES NOT ASSURE THAT THE BEST APPROACH TO SOLVING R&D PROBLEMS WOULD BE UTILIZED OR THAT WE WOULD RECEIVE THE MOST COST EFFECTIVE R&D FOR OUR EXPENDITURES. SUCH MANDATORY QUOTAS WOULD UNDULY RESTRICT OUR ABILITY TO CARRY OUT OUR R&D MISSION IN A WAY THAT MAKES SOUND BUSINESS SENSE.

QUOTAS BASED ON A PERCENTAGE OF AN AGENCY'S RESEARCH AND DEVELOPMENT BUDGET WOULD CREATE A SERIOUS PROBLEM. MUCH OF THE DoD R&D BUDGET IS SPENT FOR IN-HOUSE R&D MISSION SUPPORT. FOR EXAMPLE, THE ARMAMENT DIVISION, OF THE AIR FORCE SYSTEMS COMMAND IS PRIMARILY FUNDED WITH R&D MONEY. THIS INCLUDES CIVILIAN SALARIES AND THE MAJOR PORTION OF THE OPERATION AND MAIN-

TENANCE OF THE TEST RANGES. NORMALLY, GOALS FOR SPECIAL PLACEMENT OF CONTRACTS ARE BASED ON A PERCENTAGE OF ALL OTHER CONTRACT AWARDS WITH U.S. BUSINESS FIRMS. HOWEVER, WE DO NOT BELIEVE THAT ANY PRECISE PERCENTAGES OF EXPENDITURES CAN BE APPLICALBE TO ALL AGENCIES, IS WORKABLE, OR IS IN THE BEST INTEREST OF THE FEDERAL GOVERNMENT.

THE PROPOSED BILL MAKES NO DISTINCTION BETWEEN THE MISSION OF AGENCIES WHICH EXPEND R&D FUNDS NOR THE MANNER IN WHICH THEY ARE SPENT. THE NATIONAL SCIENCE FOUNDATION (NSF) SPENDS R&D FUNDS ON PHASED SMALL DOLLAR RESEARCH PROGRAMS SIMILAR TO THE FORMAT PRESENTED IN THE BILL. ON THE OTHER HAND, A VERY LARGE PORTION OF THE DOD R&D BUDGET IS EXPENDED ACQUIRING MAJOR SYSTEMS WHERE MINIMAL SMALL BUSINESS CAPABILITY EXISTS (EXCEPT FOR SUBCONTRACTING). IT IS NOT REASONABLE TO EXPECT THE DOD. WITH ITS MAJOR SYSTEMS, TO ACHIEVE THE SAME SBIR PERCENTAGE AS OTHER AGENCIES WHO DO NOT ACQUIRE MAJOR SYSTEMS. THEREFORE, WE DO NOT THINK IT IS FEASIBLE TO PRESCRIBE A PRECISE PERCENTAGE IN LEGISLATION WHICH WOULD BE APPLICABLE TO ALL GOVERNMENT AGENCIES. EACH AGENCY SHOULD BE PERMITTED TO ESTABLISH ITS OWN GOAL REGARDING THIS PROGRAM.

SECTION (4)(G) OF THE BILL REQUIRES EACH AGENCY TO:

A. ESTABLISH AN SBIR PROGRAM;

B. DETERMINE CATEGORIES OF PROJECTS TO BE INCLUDED IN SBIR;

C. ISSUE SBIR SOLICITATIONS IN ACCORDANCE WITH A SCHEDULE DETERMINED COOPERATIVELY WITH THE SBA:

D. RECEIVE AND EVALUATE SBIR PROPOSALS:

E. SELECT AWARDEES FOR ITS SBIR FUNDING AGREEMENTS:

F. ADMINISTER ITS OWN SBIR FUNDING AGREEMENTS:

G. MAKE PROGRESS PAYMENTS TO SBIR AWARD RECIPIENTS:

H. MAKE ANNUAL REPORT ON SBIR PROGRAM TO SBA.

WE SUPPORT ALL OF THESE REQUIREMENTS EXCEPT FOR C. AND H. WHICH REQUIRE US TO ISSUE SBIR SOLICITATIONS IN ACCORDANCE WITH A SCHEDULE DETERMINED COOPERATIVELY WITH THE SBA. THIS WOULD REQUIRE US TO DEAL WITH ANOTHER AGENCY WHICH HAS NO RESPONSIBILITY FOR NATIONAL SECURITY NOR ACTIVE INVOLVEMENT IN THE PROCUREMENT OF R&D TO BECOME DIRECTLY INVOLVED IN OUR ACQUISITION PROCESS. SUCH AN ARRANGEMENT WOULD RESULT IN MISUNDERSTANDING, CONFUSION, DELAYS AND THEREFORE, ADVERSELY AFFECT OUR NATIONAL SECURITY EFFORTS. ACCORDINGLY, WE RECOMMEND DELETION OF THIS REQUIREMENT THEREBY PROVIDING MAXIMUM FLEXIBILITY WHICH IS REQUIRED BY THE VARIOUS FEDERAL R&D AGENCIES. FURTHER, WE BELIEVE AN INTERAGENCY COORDINATING COMMITTEE SHOULD BE ESTABLISHED WHICH WOULD RECEIVE ANY PROGRAM REPORTS WHICH MAY BE REQUIRED.

SEC. 4, SECTION 9(H) WOULD REQUIRE AGENCIES WITH R&D BUDGETS IN EXCESS OF $20,000,000 TO ESTABLISH GOALS FOR PLACING AWARDS WITH SMALL BUSINESS FIRMS. THE DOD HAS ESTABLISHED SMALL BUSINESS PRIME CONTRACT GOALS SINCE THE ONSET OF THE DOD SMALL BUSINESS PROGRAM IN THE MID-FIFTIES. ALL OF OUR R&D

ACTIVITIES: SUCH AS THE ARMY DEVELOPMENT AND READINESS COMMAND, THE NAVY'S MATERIEL COMMAND AND THE AIR FORCES SYSTEM COMMAND, HAVE SMALL BUSINESS GOALS IN THEIR PROCUREMENT OF R&D. THERE ARE IN FACT FIVE DISCRETE SMALL BUSINESS GOALS: (1) PRIME CONTRACTS, (2) SET-ASIDES, (3) SUBCONTRACT, (4) DISADVANTAGED BUSINESS AWARDS WHICH INCLUDES THREE SUBSETS: PRIME CONTRACT DIRECT, SUBCONTRACT AND SECTION 8(A) AWARDS, AND (5) WOMEN-OWNED BUSINESS AWARDS.

IN MY JUDGEMENT, WE HAVE REACHED THE MAXIMUM NUMBER OF GOALS WHICH SHOULD BE PLACED ON OUR ACTIVITIES: ESTABLISHMENT OF R&D GOALS WOULD TEND TO FRAGMENT THE GOAL SETTING PROCESS AND NOT LIKELY RESULT IN ANY INCREASED AWARDS TO SMALL R&D FIRMS.

FURTHER, IT SHOULD BE RECOGNIZED THAT P.L. 95-507 CODIFIED INTO LAW THE SMALL BUSINESS GOAL SETTING PROCESS. THIS PROCESS ASSURES THAT THE R&D ELEMENT OF OUR PROCUREMENT PROCESS IS BEING GOALED.

SEC. 4 SECTION 9(J)(2) WOULD REQUIRE THE NATIONAL SCIENCE FOUNDATION AND THE SMALL BUSINESS ADMINISTRATION TO FURNISH THE ADMINISTRATOR OF THE OFFICE OF FEDERAL PROCUREMENT POLICY ADVICE AND ASSISTANCE IN THE PROMULGATION OF REGULATIONS WHICH WOULD IMPLEMENT THE PROPOSED LAW. WE DO NOT BELIEVE THIS PROVISION IS REQUIRED AS IT WOULD RESULT IN THE ADDITION OF ANOTHER LAYER OF REGULATIONS WHICH IS NOT NEEDED IN ORDER TO ACCOMPLISH THE OBJECTIVES OF THIS BILL. THIS PROVISION

PROVIDES ANOTHER AGENCY WITH AUTHORITY TO ISSUE REGULATIONS FOR WHICH THE AGENCY IS NOT STAFFED, INVOLVED OR RESPONSIBLE FOR THE PROCUREMENT OF R&D PRODUCTS AND SERVICES.

DOD R&D ACCOMPLISHMENTS

I BELIEVE WE IN DOD MAY SUFFER TO SOME DEGREE BECAUSE WE DO NOT PUBLICIZE OUR ACCOMPLISHMENTS IN SUPPORT OF SMALL BUSINESS. IN THIS REGARD, I'D LIKE TO PROVIDE SOME SPECIFICS AS TO HOW WE HWLP SMALL R&D BUSINESS FIRMS AND THOSE FIRMS SEEKING TO DO BUSINESS WITH OUR LABORATORIES.

AWARDS TO SMALL RESEARCH FIRMS IN FY 1979 SHOWED A SIGNIFICANT INCREASE EVEN IN THE FACE OF LOWERED OVERALL RESEARCH AND DEVELOPMENT EXPENDITURES ($7.8 BILLION IN FY 1978 to $7.5 BILLION IN FY 1979). THE SMALL BUSINESS RATE OF PARTICIPATION ROSE FROM 6.1% IN FY 1978 TO 6.7% IN FY 1979, WHICH RESULTED IN THE DOLLARS AWARDED TO SMALL BUSINESS INCREASING FROM $474 MILLION TO $502 MILLION. THIS PAST YEAR, FY 1980, WE HAD ANOTHER GOOD YEAR FOR SMALL R&D FIRMS WHEN WE AWARDED THEM $584 MILLION WITH THE RATE OF PARTICIPATION INCREASING TO 7.1%. THIS INCREASE ALSO REPRESENTS THE HIGHEST DOLLAR AWARDS RATE OF SMALL BUSINESS R&D PARTICIPATION IN THE HISTORY OF THE DOD SMALL BUSINESS PROGRAM. IT APPEARS WE'LL DO EVEN BETTER THIS FISCAL YEAR BECAUSE AS OF THE FIRST HALF OF FY 1981, OUR SMALL BUSINESS R&D AWARDS ARE AT $439 MILLION OR $166 MILLION MORE THAN THE $273 MILLION AWARDED DURING

THE SAME PERIOD LAST YEAR. OF EVEN GREATER SIGNIFICANCE, IS THAT THE RATE OF SMALL BUSINESS PARTICIPATION HAS INCREASED FROM 5.9 TO 7.2 PERCENT DURING THIS SAME PERIOD. THIS CAN BE CONSIDERED A QUANTUM INCREASE IN PERFORMANCE WHICH IS DUE PRIMARILY TO THE ARMY AND NAVY WHO DOUBLED THEIR PREVIOUS HALF YEARS PERFORMANCE. ENCLOSURES FIVE - SEVEN SHOWS OUR DETAILED R&D PERFORMANCE.

I WOULD LIKE TO POINT OUT THESE AWARDS WERE MADE TO U.S. SMALL BUSINESS FIRMS AND DO NOT INCLUDE AWARDS TO UNIVERSITIES AND NONPROFIT INSTITUTIONS.

EVEN WITH OUR SIGNIFICANT IMPROVED PERFORMANCE, WE ARE NOT SATISFIED. WE ARE CONDUCTING A MOST COMPREHENSIVE PROGRAM TO REACH AS MANY SMALL R&D FIRMS AS POSSIBLE IN ORDER TO CAPTURE THE BENEFITS OF THEIR IMAGINATIVE AND INNOVATIVE CAPABILITY. THIS OUTREACH PROGRAM INCLUDES:

(1) PROVIDING R&D PROCUREMENT INFORMATION TO ALL SEGMENTS OF THE BUSINESS COMMUNITY;

(2) PROVIDING COUNSELING TO BUSINESS PERSONS ON AN INDIVIDUAL BASIS AS WELL AS AT FEDERAL PROCUREMENT CONFERENCES SPONSORED BY THE MEMBERS OF CONGRESS IN THEIR LOCAL CONSTITUENCIES;

(3) APPOINTMENT OF SMALL BUSINESS TECHNICAL ADVISORS WHO ARE ASSIGNED TO OUR LABORATORIES AND PROVIDE ASSISTANCE TO THE SMALL R&D TECHNICAL ENTREPRENEUR WHO IS SEEKING ASSISTANCE FROM A TECHNICAL RATHER THAN A PROCUREMENT STANDPOINT.

(4) THE FOURTH ASPECT OF OUR OUTREACH PROGRAM IS IN KEEPING WITH THE OBJECTIVES OF S. 881 TO ESTABLISH AN AGENCY SBIR PROGRAM. WE WHOLEHEARTEDLY SUPPORT THIS CONCEPT AS WE BELIEVE IT IS THE MOST FAR REACHING INITIATIVE TO BRING SMALL INNOVATIVE HIGH TECHNOLOGY FIRMS INTO THE FEDERAL GOVERNMENT'S PROCUREMENT PROCESS FOR R&D. OUR CONVICTION OF THE SOUNDNESS OF THE SBIR PROGRAM APPROACH IS EVIDENCED BY THE FACT THAT WE INITIATED THE DEVELOPMENT OF AN ALMOST IDENTICAL PROGRAM APPROXIMATELY A YEAR AGO.

OUR PROGRAM WILL BE CONDUCTED IN THREE PHASES:

- PHASE I
  20 PROJECT AREAS (100 CONTRACTS TO BE AWARDED)
  AWARDS UP TO $50,000
- PHASE II
  ADVANCED DEVELOPMENT CONTRACTS
  AWARDS FROM $100,000 TO $500,000
- PHASE III

FOLLOW-ON PRODUCTION AWARDS, WHERE APPROPRIATE AND/OR COMMERCIAL APPLICATION OF THE PRODUCT OR SERVICE DEVELOPED AS A RESULT OF THIS PROGRAM. COMMERCIAL APPLICATION WOULD BE FUNDED WITH PRIVATE VENTURE CAPITAL.

THESE AWARDS WILL BE MADE BY THE ARMY, NAVY, AIR FORCE AND THE DEFENSE ADVANCED RESEARCH PROKECTS AGENCY.

WE HAVE MAILED OUT APPROXIMATELY 27,000 COPIES OF OUR PROGRAM OPPORTUNITIES BROCHURE WHICH I PROVIDED TO YOUR COMMITTEE. APPROXIMATELY 12,000 OF THESE COPIES WERE DISTRIBUTED IN RESPONSE TO WRITTEN AND TELEPHONE REQUESTS WITH THE REMAINDER BEING DISTRIBUTED BASED ON MAILING LISTS WHICH WERE PROVIDED TO US BY TRADE ASSOCIATIONS AND OTHER ORGANIZATIONS.

RESPONSES FROM SMALL R&D BUSINESS FIRMS ARE DUE IN BY AUGUST 30 AND WE PLAN TO MAKE PHASE I AWARDS BY 15 DECEMBER 1981.

THERE ARE SEVERAL OTHER ASPECTS ASSOCIATED WITH OUR OUTREACH PROGRAM WHICH I HAVE INCLUDED AS AN ENCLOSURE TO MY STATEMENT. (SEE ENCLOSURE 8)

I BELIEVE THAT ALL OF THESE OUTREACH EFFORTS AND PARTICULARLY THE RECENTLY ESTABLISHED DEFENSE SMALL BUSINESS ADVANCED TECHNOLOGY PROGRAM WILL MATERIALLY CONTRIBUTE TO INCREASING OUR AWARDS TO SMALL R&D FIRMS AND CONCURRENTLY WILL ENABLE US TO FURTHER EXPLOIT THE TECHNICAL AND INNOVATIVE CAPABILITY POSSESSED BY THESE SMALL FIRMS.

MR. CHAIRMAN, WE SUPPORT S. 881 BUT STRONGLY RECOMMEND THAT IT BE AMENDED TO ACCOMMODATE THE CONCERNS I EXPRESSED EARLIER IN MY TESTIMONY. WE UNDERSTAND THE SIGNIFICANCE OF SMALL R&D FIRMS TO OUR NATIONAL SECURITY AND YOU MAY BE ASSURED WE WILL CONTINUE TO DO EVERYTHING POSSIBLE TO ENHANCE THEIR PARTICIPATION IN A LARGER SHARE OF OUR CONTRACT AWARDS.

I WILL BE GLAD TO ANSWER ANY QUESTIONS YOU MAY HAVE.

PRIME CONTRACT AWARDS TO BUSINESS FIRMS[1]

	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80
TOTAL AWARDS TO ALL FIRMS	$34,046	32,478	34,518	38,213	38,998	47,114	54,359	58,544	66,704
TOTAL AWARDS TO SMALL FIRMS	$ 6,128	6,672	7,074	7,895	8,108	9,535	10,735	12,170	13,588
PERCENT TO SMALL FIRMS	18.0%	20.5%	20.5%	20.7%	20.8%	20.2%	19.7%	20.8%	20.4%
TOTAL AWARDS TO DISADVANTAGED BUSINESS FIRMS[2]	*	*	$ 19	26	27	62	216	359	494
PERCENT TO DISADVANTAGED BUSINESS FIRMS[2]	*	*	0.1%	0.1%	0.1%	0.1%	0.4%	0.6%	0.7%
TOTAL SMALL BUSINESS SET-ASIDE AWARDS	$ 1,752	1,890	1,817	2,251	2,291	2,890	3,434	4,105	4,787
PERCENT TO SET-ASIDES TO TOTAL AWARDS TO ALL FIRMS	5.1%	5.8%	5.3%	5.9%	5.9%	6.1%	6.3%	7.0%	7.2%

*IDENTIFICATION OF MINORITY FIRMS NOT STARTED.

[1] DOLLARS EXPRESSED IN MILLIONS

[2] EXCLUDES AWARDS UNDER THE 8(a) PROGRAM

Enclosure 1

SMALL BUSINESS SET ASIDE AWARDS
FY 80 AND FY 79 COMPARISON
(BILLIONS)

		TOTAL AWARDS	SA AWARDS	%
DOD	FY 80	$66.7	$4.787	7.2
	FY 79	58.5	4.105	7.0
ARMY	FY 80	$13.4	$1.305	9.7
	FY 79	12.2	1.201	9.9
NAVY	FY 80	$22.8	$1.168	5.1
	FY 79	20.9	1.123	5.4
AIR FORCE	FY 80	$18.7	$0.982	5.3
	FY 79	16.2	0.740	4.6
DLA	FY 80	$8.4	$0.967	11.5
	FY 79	6.4	0.764	11.9

Enclosure 2

DEFENSE SMALL BUSINESS SUBCONTRACTING PROGRAM

	FY 73	FY 74	FY 75	FY 76 +T	FY 77	FY 78	FY 79	FY 80
1. NO. CONTRACTORS REPORTING	765	713	701	733	737	810	833	1,023
2. VALUE SUBCONTRACTS	$11,094	$12,050	$12,712	$15,109	$15,038	$17,482	$21,244	$25,499
A. LARGE BUSINESS	7,123	7,443	7,717	9,445	9,175	10,367	12,174	14,675
B. SMALL BUSINESS	3,971	4,607	4,995	5,664	5,863	7,115	9,070	10,824
C. SMALL DISAD. BUSINESS	22	52	72	131	153	251	344	452
3. % SUBCONTRACTED								
LARGE BUSINESS	64.2%	61.8%	60.7%	62.5%	61.0%	59.2%	57.3%	57.6%
SMALL BUSINESS	35.8%	38.2%	39.3%	37.5%	39.0%	40.7%	42.7%	42.4%
SMALL DISAD. BUSINESS	0.2%	0.4%	0.6%	0.9%	1.0%	1.4%	1.6%	1.8%

DOLLARS IN MILLIONS

Enclosure 3

SMALL DISADVANTAGED BUSINESS AWARDS

	FY 69	FY 70	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76 +T	FY 77	FY 78	FY 79	FY 80
SECTION (8a)	$8.5	13.4	27.4	72.8	97.7	144.1	170.3	279.6	310.9	404.8	550.4	713.6
SUBCONTRACT	*	*	*	*	$22.1	52.2	69.1	131.0	153.2	250.6	344.5	452.3
DIRECT (PRIME)	*	*	*	*	*	$19.0	26.0	27.0	61.7	216.3	358.9	493.5
TOTAL DOD	$8.5	13.4	27.4	72.8	119.8	215.3	265.4	437.6	525.8	871.7	1,253.8	1,659.4

$ = IN MILLIONS

*IDENTIFICATION OF PROGRAM PERFORMANCE NOT STARTED

Enclosure 4

DEPARTMENT OF DEFENSE
R&D AWARDS TO ALL BUSINESS FIRMS
(MILLIONS)

FISCAL YEAR	TOTAL AWARDS	SB AWARDS	%
72	$5,168	$256	4.9
73	5,656	272	4.8
74	5,148	300	5.8
75	5,601	316	5.6
76 + 7T	7,543	396	5.3
77	7,120	389	5.5
78	7,829	474	6.1
79	7,508	502	6.7
80	8,234	584	7.1
1/2 80	4,663	274	5.9
1/2 81	6,065	439	7.2

Enclosure 5

RDTE CONTRACT AWARDS TO SMALL BUSINESS

(MILLIONS)

	TOTAL	(%)	RES	(%)	DEV	(%)	MGMT & SPT	(%)
1970	$189.1	(4.0)	$31.0	(33.3)	$139.8	(3.2)	$18.3	(5.3)
1971	183.3	(3.7)	28.2	(31.1)	133.6	(3.0)	21.5	(6.9)
1972	255.6	(4.9)	34.6	(33.7)	193.8	(4.0)	27.2	(11.0)
1973	272.1	(4.8)	42.7	(29.4)	201.0	(3.8)	28.4	(11.1)
1974	300.4	(5.8)	40.7	(26.1)	223.9	(4.7)	35.8	(13.0)
1975	316.4	(5.6)	38.8	(29.8)	243.3	(4.7)	34.3	(11.3)
1976	311.4	(5.2)	35.7	(24.6)	231.9	(4.2)	43.8	(10.7)
1976 +7T	396.2	(5.3)	46.6	(24.7)	291.0	(4.3)	58.6	(11.2)
1977	389.1	(5.5)	45.2	(25.3)	295.9	(4.5)	48.0	(11.1)
1978	474.1	(6.1)	47.2	(29.2)	367.2	(5.1)	59.7	(13.6)
1979	502.3	(6.7)	65.7	(48.8)	387.3	(6.0)	49.4	(5.4)
1980	584.2	(7.1)	83.1	(26.3)	446.2	(6.3)	54.9	(6.5)

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Enclosure 6

SMALL BUSINESS R&D AWARDS

	1973	1974	1975	1976	1977	1978	1979	1980
ARMY								
TOTAL $ AWDS	$1,285	$1,349	$1,279	$1,273	$1,506	$1,994	$1,805	$1,836
SB $ AWDS	107	108	107	107	70	81	92	105
SB %	8.4	8.0	9.0	8.4	4.7	4.1	5.1	5.7
NAVY								
TOTAL $ AWDS	$2,084	$1,700	$1,720	$2,135	$2,351	$2,369	$2,630	$2,695
SB $ AWDS	97	120	123	123	161	186	184	206
SB %	4.6	7.1	7.1	5.8	6.9	7.9	7.0	7.6
AIR FORCE								
TOTAL $ AWDS	$2,287	$2,099	$2,697	$2,620	$3,059	$2,940	$2,749	$3,332
SB $ AWDS	68	72	87	81	110	136	139	173
SB %	3.0	3.4	3.2	3.1	3.5	4.7	5.1	5.1
OTHER								
TOTAL $ AWDS	*	*	*	*	$205	$255	$323	$370
SB $ AWDS					50	69	87	101
SB %					24.3	27.1	27.0	27.3
TOTAL								
TOTAL $ AWDS	$5,656	$5,148	$5,601	$6,028	$7,121	$7,829	$7,508	$8,234
SB $ AWDS	272	300	316	311	389	474	502	584
SB %	4.8	5.8	5.6	5.2	5.5	6.1	6.7	7.1

$ IN MILLIONS

*FIGURES INCLUDED IN ARMY

Enclosure 7

DOD RESEARCH AND DEVELOPMENT OUTREACH PROGRAM

Bidders Mailing List

The DoD is involved in several actions in order to assist the small R&D firm. One is to get the "word" out to the small R&D businessperson as to how to do business with DoD, which DoD activities purchase what kinds of R&D and who small firms can contact for assistance. The key to increasing awards to small R&D firms is the assurance that an increased number of small firms can be expected to bid on DoD R&D procurements. This can be enhanced by having as many small firms as possible make application to be included in the Bidder's Mailing List of DoD procuring activities.

Federal Procurement Conferences

DoD is also actively engaged with the Department of Commerce in supporting the Federal Procurement Conferences which are sponsored by individual members of Congress in their local districts or states. At each of these conferences, DoD provides a senior Small Business Advisor from one of the Military Services or the Defense Logistics Agency as well as other DoD representatives from DoD activities located in the proximity of the Congressional member's constituency.

Enclosure 8

Technology Transfer

It is the policy of the DoD to promote military-civilian technology transfer and cooperative development. This policy encompasses (1) the transfer of technology developed by DoD activities for national defense purposes to the civilian sector where such technology can be profitably utilized non-military applications, and (2) the identification of coming technologies of both military and civilian interest and the exploration of the feasibility for cooperative funding and for development of such technologies.

We accomplish this primarily through our Defense Documentation Center (DDC). DDC assists these Government contractors -- and potential Defense contractors -- by supplying technical reports of completed R&D efforts as well as summaries of ongoing R&D projects. These services are available to all U.S. Government activities and to their contractors, subcontractors and grantees -- regardless of size.

The systematic and timely availability of these technical reports and current project summaries helps significantly to prevent or reduce unnecessary duplication of R&D project work and to accelerate the completion and application of research information in order to shorten the "concept-to-delivery" cycle.

The DDC technical document collection totals more than a million different titles, covering all areas of science and technology. Information in these reports could enhance the efforts of aerodynamicists,

STATEMENT

BY

MR. WILLIAM A LONG
DEPUTY UNDER SECRETARY OF DEFENSE
FOR RESEARCH AND ENGINEERING

(ACQUISITION MANAGEMENT)

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE,

I AM WILLIAM LONG, I SERVE AS THE DEPUTY UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING, (ACQUISITION MANAGEMENT). I WELCOME THIS OPPORTUNITY TO APPEAR BEFORE YOUR COMMITTEE TO EXPLAIN OUR SMALL BUSINESS RESEARCH AND DEVELOPMENT PROGRAM AND COMMENT ON SEVEN BILLS WHICH HAVE AS THEIR PURPOSE TO STRENGTHEN THE ROLE OF SMALL R&D FIRMS TO MEET AGENCY NEEDS AND TO CONTRIBUTE TO THE GROWTH AND STRENGTHENING OF THE NATION'S ECONOMY. THESE BILLS ARE S. 881, H.R. 11, H.R. 309, H.R. 4254, H.R. 4326, H.R. 4343 and H.R. 4373.

I HAVE WITH ME MRS. NORMA B. LEFTWICH WHO IS THE DOD DIRECTOR OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION AND MR. HAL C. FELSHER WHO IS THE DIRECTOR FOR SMALL BUSINESS AND ECONOMIC UTILIZATION POLICY. THE DEPARTMENT OF DEFENSE HAS A SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) AND IT HAS JUST SUCH A PROGRAM AS ENVISIONED BY THESE BILLS BECAUSE OF THE PERSONAL AND DETERMINED EFFORTS OF HAL FELSHER.

BEFORE COMMENTING ON THESE BILLS I WOULD LIKE TO NOTE THAT IN ESTABLISHING AN SBIR PROGRAM ONE MUST RECOGNIZE THAT SUCH A PROGRAM REQUIRES THE PLACEMENT OF AWARDS ON A SMALL BUSINESS RESTRICTED SET-ASIDE BASIS. WE, IN THE DEPARTMENT OF DEFENSE, BELIEVE IN AND VERY STRONGLY SUPPORT THE SMALL BUSINESS SET-ASIDE

PROGRAM AS IT IS OUR THESIS THAT THE WHOLE SET-ASIDE PROGRAM IS THE UNDERPINNING OF OUR ENTIRE SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS PROGRAMS. THE REASONS I SAY "WHOLE" SET-ASIDE PROGRAM IS THAT SETTING ASIDE PROCUREMENTS FOR RESEARCH AND DEVELOPMENT IS RADICALLY DIFFERENT THAN SETTING ASIDE ANY OTHER OF OUR PRODUCT AND SERIVCES REQUIREMENTS. FOR THE NINE YEARS BETWEEN FY 1972 AND FY 1980 OUR SET-ASIDES FOR ALL OF OUR PRODUCTS AND SERVICES HAVE AVERAGED 6.1 PERCENT. FOR R&D, SET-ASIDES HAVE AVERAGED ONLY 0.4 OF A PERCENT OF OUR TOTAL PRIME CONTRACT AWARDS WITH U.S. BUSINESS. SEE ENCLOSURES 1 AND 2.

R&D SMALL BUSINESS SET-ASIDES ARE LOW BECAUSE OF THE REQUIREMENT TO SEEK THE BEST SCIENTIFIC AND TECHNOLOGICAL SOURCES AVAILABLE CONSISTENT WITH THE NATURE OF A PROPOSED PROCUREMENT. UNDER THESE CIRCUMSTANCES, THERE IS AN UNDERSTANDABLE RELUCTANCE TO EXCLUDE FROM COMPETITION ANY INNOVATOR BUSINESS CONCERNS WHICH APPEAR TO HAVE A TECHNICAL COMPETENCE IN THE SPECIFIC FIELD OF R&D BEING CONSIDERED.

WE HAVE MADE A COMPREHENSIVE REVIEW OF THESE SEVEN BILLS AND COMPLETELY SUPPORT THEIR PURPOSES TO: (1) STIMULATE TECHNOLOGICAL INNOVATIONS: (2) USE SMALL BUSINESSES TO MEET FEDERAL R&D NEEDS AND (3) INCREASE PRIVATE SECTOR COMMERCIALIZATION OF INNOVATIONS DERIVED FROM FEDERAL R&D. HOWEVER, WE OPPOSE CERTAIN PROVISIONS IN THE BILL DESIGNED TO ACHIEVE THESE OBJECTIVES.

WE SUPPORT THE ESTABLISHMENT OF A MULTI-AGENCY SBIR PILOT PROGRAM WITH THE PARTICIPATING AGENCIES TO BE DESIGNATED BY THE PRESIDENT. BY CONDUCTING THIS PROGRAM ON A PILOT BASIS, IT WILL ENABLE US TO TEST THE CONCEPT, IDENTIFY WHAT PROBLEMS MAY BE INVOLVED AND DETERMINE WHETHER TO ESTABLISH THE PROGRAM ON A PERMANENT BASIS.

WE OPPOSE MANDATORY QUOTAS FOR SMALL BUSINESS R&D CONTRACT AWARDS. TO ARBITRARILY ESTABLISH A MANDATORY QUOTA DOES NOT ASSURE THAT THE BEST APPROACH TO SOLVING R&D PROBLEMS WOULD BE UTILIZED OR THAT WE WOULD RECEIVE THE MOST COST EFFECTIVE R&D FOR OUR EXPENDITURES. SUCH MANDATORY QUOTAS WOULD UNDULY RESTRICT OUR ABILITY TO CARRY OUT OUR R&D MISSION IN A WAY THAT MAKES SOUND BUSINESS SENSE.

QUOTAS BASED ON A PERCENTAGE OF AN AGENCY'S RESEARCH AND DEVELOPMENT BUDGET WOULD CREATE A SERIOUS PROBLEM. MUCH OF THE DOD R&D BUDGET IS SPENT FOR IN-HOUSE R&D MISSION SUPPORT. FOR EXAMPLE, THE ARMAMENT DIVISION OF THE AIR FORCE SYSTEMS COMMAND IS PRIMARILY FUNDED WITH R&D MONEY. THIS INCLUDES CIVILIAN SALARIES AND THE MAJOR PORTION OF THE OPERATION AND MAINTENANCE OF THE TEST RANGES. NORMALLY, GOALS FOR SPECIAL PLACEMENT OF CONTRACTS ARE BASED ON A PERCENTAGE OF ALL OTHER CONTRACT AWARDS WITH U.S. BUSINESS FIRMS. HOWEVER, WE DO NOT BELIEVE THAT ANY PRECISE PERCENTAGES OF EXPENDITURES CAN BE APPLICABLE TO ALL AGENCIES, THAT SUCH AN APPROACH IS WORKABLE, OR IS IN THE BEST INTEREST OF THE FEDERAL GOVERNMENT.

THE PROPOSED BILL MAKES NO DISTINCTION BETWEEN THE MISSION OF AGENCIES WHICH EXPEND R&D FUNDS NOR THE MANNER IN WHICH THEY ARE SPENT. THE NATIONAL SCIENCE FOUNDATION (NSF) SPENDS R&D FUNDS ON PHASED SMALL DOLLAR RESEARCH PROGRAMS SIMILAR TO THE FORMAT PRESENTED IN THE BILL. ON THE OTHER HAND, A VERY LARGE PORTION OF THE DOD R&D BUDGET IS EXPENDED ACQUIRING MAJOR SYSTEMS WHERE MINIMAL SMALL BUSINESS CAPABILITY EXISTS (EXCEPT FOR SUBCONTRACTING). IT IS NOT REASONABLE TO EXPECT THE DOD, WITH ITS MAJOR SYSTEMS, TO ACHIEVE THE SAME SBIR PERCENTAGE AS OTHER AGENCIES WHO DO NOT ACQUIRE MAJOR SYSTEMS. THEREFORE, WE DO NOT THINK IT IS FEASIBLE TO PRESCRIBE A PRECISE PERCENTAGE IN LEGISLATION WHICH WOULD BE APPLICABLE TO ALL GOVERNMENT AGENCIES. EACH AGENCY SHOULD BE PERMITTED TO ESTABLISH ITS OWN GOAL REGARDING THIS PROGRAM.

THESE BILLS REQUIRE EACH AGENCY TO ACCOMPLISH EIGHT FUNCTIONS IN SUPPORT OF THE SBIR PROGRAM. WE OBJECT TO ONLY TWO OF THESE PROVISIONS. ONE OF THESE IS THE PROCEDURE WHICH WOULD REQUIRE US TO COORDINATE THE ISSUE OF OUR SBIR SOLICITATIONS WITH ANOTHER AGENCY WHICH HAS NO RESPONSIBILITY FOR NATIONAL SECURITY OR ACTIVE INVOLVEMENT IN THE PROCUREMENT OF R&D PRODUCTS AND SERVICES. THE OTHER PROVISION TO WHICH WE OBJECT IS THE REQUIREMENT TO SUBMIT REPORTS TO THE SBA. IN THIS REGARD, WE BELIEVE AN INTERAGENCY COORDINATING COMMITTEE SHOULD BE FORMED TO RECEIVE ANY REPORTS WHICH MAY BE REQUIRED.

THESE BILLS WOULD ALSO REQUIRE THE NATIONAL SCIENCE FOUNDATION AND THE SMALL BUSINESS ADMINISTRATION TO FURNISH THE ADMINISTRATOR OF THE OFFICE OF FEDERAL PROCUREMENT POLICY ADVICE AND ASSISTANCE IN THE PROMULGATION OF REGULATIONS WHICH WOULD IMPLEMENT THE PROPOSED LAW. WE DO NOT BELIEVE THIS PROVISION IS REQUIRED AS IT WOULD RESULT IN THE ADDITION OF ANOTHER LAYER OF REGULATIONS WHICH IS NOT NEEDED IN ORDER TO ACCOMPLISH THE OBJECTIVES OF TH~~IS~~ESE BILLS

THIS PROVISION PROVIDES ANOTHER AGENCY WITH AUTHORITY TO ISSUE REGULATIONS FOR WHICH THE AGENCY IS NOT STAFFED, INVOLVED, OR RESPONSIBLE FOR THE PROCUREMENT OF R&D PRODUCTS AND SERVICES.

WE DO NOT BELIEVE THERE IS ANY REQUIREMENT TO ESTABLISH SEPARATE AGENCY-WIDE R&D SMALL BUSINESS GOALS AS SUCH GOALS ARE ALREADY INCLUDED IN THE SMALL BUSINESS GOALS WE ESTABLISH ON AN ANNUAL BASIS IN ACCORDANCE WITH P. L. 95-507.

DOD R&D ACCOMPLISHMENTS

I BELIEVE WE IN DOD MAY SUFFER TO SOME DEGREE BECAUSE WE DO NOT PUBLICIZE OUR ACCOMPLISHMENTS IN SUPPORT OF SMALL BUSINESS. IN THIS REGARD, I'D LIKE TO PROVIDE SOME SPECIFICS AS TO HOW WE HELP SMALL R&D BUSINESS FIRMS AND THOSE FIRMS SEEKING TO DO BUSINESS WITH OUR LABORATORIES.

AWARDS TO SMALL RESEARCH FIRMS IN FY 1979 SHOWED A SIGNIFICANT INCREASE EVEN IN THE FACE OF LOWERED OVERALL RESEARCH AND DEVELOPMENT EXPENDITURES ($7.8 BILLION IN FY 1978 to $7.5

BILLION IN FY 1979). THE SMALL BUSINESS RATE OF PARTICIPATION ROSE FROM 6.1% IN FY 1978 TO 6.7% IN FY 1979, WHICH RESULTED IN THE DOLLARS AWARDED TO SMALL BUSINESS INCREASING FROM $474 MILLION TO $502 MILLION. THIS PAST YEAR, FY 1980, WE HAD ANOTHER GOOD YEAR FOR SMALL R&D FIRMS WHEN WE AWARDED THEM $584 MILLION WITH THE RATE OF PARTICIPATION INCREASING TO 7.1%. THIS INCREASE ALSO REPRESENTS THE HIGHEST DOLLAR AWARDS RATE OF SMALL BUSINESS R&D PARTICIPATION IN THE HISTORY OF THE DOD SMALL BUSINESS PROGRAM. IT APPEARS WE'LL DO EVEN BETTER THIS FISCAL YEAR BECAUSE AS OF THE THIRD QUARTER OF FY 1981, OUR SMALL BUSINESS R&D AWARDS ARE AT $491 MILLION OR $93 MILLION MORE THAN THE $398 MILLION AWARDED DURING THE SAME PERIOD LAST YEAR. OF EVEN GREATER SIGNIFICANCE, IS THAT THE RATE OF SMALL BUSINESS PARTICIPATION HAS INCREASED FROM 6.3 TO 6.9 PERCENT DURING THIS SAME PERIOD. ENCLOSURES TWO - FIVE SHOW OUR DETAILED R&D PERFORMANCE.

EVEN WITH OUR SIGNIFICANT IMPROVED PERFORMANCE, WE ARE NOT SATISFIED. WE ARE CONDUCTING A MOST COMPREHENSIVE PROGRAM TO REACH AS MANY SMALL R&D FIRMS AS POSSIBLE IN ORDER TO CAPTURE THE BENEFITS OF THEIR IMAGINATIVE AND INNOVATIVE CAPABILITY. THIS OUTREACH PROGRAM INCLUDES:

(1) PROVIDING R&D PROCUREMENT INFORMATION TO ALL SEGMENTS OF THE BUSINESS COMMUNITY;

(2) PROVIDING COUNSELING TO BUSINESS PERSONS ON AN INDIVIDUAL BASIS AS WELL AS AT FEDERAL PROCUREMENT CONFERENCES SPONSORED BY THE MEMBERS OF CONGRESS IN THEIR LOCAL CONSTITUTENCIES;

(3) APPOINTMENT OF SMALL BUSINESS TECHNICAL ADVISORS WHO ARE ASSIGNED TO OUR LABORATORIES AND PROVIDE ASSISTANCE TO THE SMALL R&D TECHNICAL ENTREPRENEUR WHO IS SEEKING ASSISTANCE

FROM A TECHNICAL RATHER THAN A PROCUREMENT STANDPOINT.

(4) THE FOURTH ASPECT OF OUR OUTREACH PROGRAM IS IN KEEPING WITH THE OBJECTIVES OF THESE BILLS BEFORE THE SENATE AND THE HOUSE TO ESTABLISH AN AGENCY SBIR PROGRAM. WE WHOLEHEARTEDLY SUPPORT THIS CONCEPT AS WE BELIEVE IT IS THE MOST FAR REACHING INITIATIVE TO BRING SMALL INNOVATIVE HIGH TECHNOLOGY FIRMS INTO THE FEDERAL GOVERNMENT'S PROCUREMENT PROCESS FOR R&D. OUR CONVICTION OF THE SOUNDNESS OF THE SBIR PROGRAM APPROACH IS EVIDENCED BY THE FACT THAT WE INITIATED THE DEVELOPMENT OF AN ALMOST IDENTICAL PROGRAM APPROXIMATELY A YEAR AGO.

OUR PROGRAM WILL BE CONDUCTED IN THREE PHASES:

- PHASE I
  20 PROJECT AREAS (100 CONTRACTS TO BE AWARDED)
  AWARDS UP TO $50,000
- PHASE II
  ADVANCED DEVELOPMENT CONTRACTS
  AWARDS FROM $100,000 TO $500,000
- PHASE III

FOLLOW-ON PRODUCTION AWARDS, WHERE APPROPRIATE AND/OR COMMERCIAL APPLICATION OF THE PRODUCT OR SERVICE DEVELOPED AS A RESULT OF THIS PROGRAM. COMMERCIAL APPLICATION WOULD BE FUNDED WITH PRIVATE VENTURE CAPITAL.

WE WHOLEHEARTEDLY SUPPORT THE OBJECTIVES AND PURPOSES OF THESE BILLS TO REQUIRE AGENCIES TO ESTABLISH AN SBIR PROGRAM AS WE BELIEVE THIS CONCEPT TO BE THE MOST FAR REACHING INITIATIVE TO DATE TO BRING SMALL INNOVATIVE HIGH TECHNOLOGY FIRMS IN THE FEDERAL GOVERNMENT'S PROCUREMENT PROCESS FOR R&D PRODUCTS AND SERVICES.

OUR CONVICTION OF THE SOUNDNESS OF THE SBIR PROGRAM APPROACH IS EVIDENCED BY THE FACT THAT WE INITIATED THE DEVELOPMENT OF AN ALMOST IDENTICAL PROGRAM THE DEFENSE SMALL BUSINESS ADVANCED TECHNOLOGY (DESAT) PROGRAM APPROXIMATELY A YEAR AGO. BETWEEN 30 APRIL AND THE END OF AUGUST WE DISTRIBUTED OVER 30,000 PROGRAM OPPORTUNITY BROCHURES TO INTERESTED PARTICIPANTS. WE HAVE RECEIVED PROPOSAL FROM 1,073 SMALL BUSINESS R&D FIRMS AND HOPE TO MAKE 100 PHASE I AWARDS BY 15 DECEMBER 1981.

TALKING POINTS

.DOD HAS ADMIRABLE RECORD OF SUPPORT OF SMALL BUSINESS IN GENERAL SMALL R&D FIRMS IN PARTICULAR

- FEDERAL GOVERNMENT WIDE - APPROXIMATELY 4% OF R&D FUNDS SPENT WITH SMALL BUSINESSES AS OPPOSED TO DOD SPENDING 7% - REFLECTS COMMITMENT.

.SMALL BUSINESS PLAY A VITAL ROLE IN INDUSTRIAL BASE

- PARTICULARLY AT THE SUPPLIER AND VENDOR LEVEL
- AS SUCH, WE MUST AND WILL CONTINUE TO SUPPORT A STRONG AND VIABLE OVERALL SMALL BUSINESS PROGRAM
- PERSONALLY SHARE COMMITMENT OF DEPSEC CARLUCCI AND UNDER SECRETARY FOR R&E DR. DELAUER TO SAME

.WE PARTICULARLY UNDERSTAND AND APPRECIATE THE IMPORTANCE OF SMALL R&D FIRMS TO OUR NATIONAL SECURITY

- BE ASSURED WE WILL CONTINUE TO DO EVERYTHING FEASIBLE TO ENHANCE THEIR PARTICIPATION IN A LARGER SHARE OF OUR CONTRACT AWARDS.

I WILL BE GLAD TO ANSWER ANY QUESTIONS YOU MAY HAVE.

PRIME CONTRACT AWARDS TO BUSINESS FIRMS[1]

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TOTAL AWARDS TO ALL FIRMS	$34.048	32.478	34.518	38.213	38.898	47.114	54.369	58.544	66.704
TOTAL AWARDS TO SMALL FIRMS	$ 6.128	6.672	7.074	7.896	8.108	9.535	10.735	12.170	13.608
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TOTAL AWARDS TO DISADVANTAGED BUSINESS FIRMS[2]	*	*	$ 19	26	27	62	216	359	494
PERCENT TO DISADVANTAGED BUSINESS FIRMS[2]	*	*	0.1%	0.1%	0.1%	0.1%	0.4%	0.6%	0.7%
TOTAL SMALL BUSINESS SET-ASIDE AWARDS	$ 1.762	1.890	1.817	2.251	2.291	2.890	3.434	4.105	4.787
PERCENT TO SET-ASIDES TO TOTAL AWARDS TO ALL FIRMS	5.1%	5.8%	5.3%	5.9%	5.9%	6.1%	6.3%	7.0%	7.2%

*IDENTIFICATION OF MINORITY FIRMS NOT STARTED.

[1] DOLLARS EXPRESSED IN MILLIONS

[2] EXCLUDES AWARDS UNDER THE 8(a) PROGRAM

Enclosure 1

R&D AWARDS TO ALL BUSINESS FIRMS
(MILLIONS)

FISCAL YEAR	TOTAL AWARDS	SB AWARDS	%	SA AWARDS	%
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74	5,148	300	5.8	12.2	0.2
75	5,601	316	5.6	15.7	0.3
76 + 7T	7,543	396	5.3	N/A	N/A
77	7,120	389	5.5	24.1	0.4
78	7,829	474	6.1	32.5	0.4
79	7,508	502	6.7	46.6	0.6
80	8,234	584	7.1	58.9	0.7

Enclosure 2

DEPARTMENT OF DEFENSE
R&D AWARDS TO ALL BUSINESS FIRMS
(MILLIONS)

FISCAL YEAR	TOTAL AWARDS	SB AWARDS	%
72	$5,168	$256	4.9
73	5,656	272	4.8
74	5,148	300	5.8
75	5,601	316	5.6
76 + 7T	7,543	396	5.3
77	7,120	389	5.5
78	7,829	474	6.1
79	7,508	502	6.7
80	8,234	584	7.1
3rd Qtr 80	6,333	398	6.3
3rd Qtr 81	7,089	491	6.9

998-1

Enclosure 3

RDTE CONTRACT AWARDS TO SMALL BUSINESS
(MILLIONS)

	TOTAL	(%)	RES	(%)	DEV	(%)	MGMT & SPT	(%)
1970	$189,1	(4.0)	$31.0	(33.3)	$139.8	(3.2)	$18.3	(6.3)
1971	183.3	(3.7)	28.2	(31.1)	133.6	(3.0)	21.5	(6.9)
1972	255.6	(4.9)	34.6	(33.7)	193.8	(4.0)	27.2	(11.0)
1973	272.1	(4.8)	42.7	(29.4)	201.0	(3.8)	28.4	(11.1)
1974	300.4	(5.8)	40.7	(26.1)	223.9	(4.7)	35.8	(13.0)
1975	316.4	(5.6)	38.8	(29.8)	243.3	(4.7)	34.3	(11.3)
1976	311.4	(5.2)	35.7	(24.6)	231.9	(4.2)	43.8	(10.7)
1976 + 7T	396.2	(6.3)	46.6	(24.7)	291.0	(4.3)	58.6	(11.2)
1977	389.1	(5.5)	45.2	(26.3)	295.9	(4.5)	48.0	(11.1)
1978	474.1	(6.1)	47.2	(29.2)	367.2	(5.1)	59.7	(13.6)
1979	502.3	(6.7)	65.7	(48.8)	387.3	(6.0)	49.4	(5.4)
1980	584.2	(7.1)	83.1	(26.3)	446.2	(6.3)	54.9	(6.5)

1455 1

Enclosure 4

SMALL BUSINESS R&D AWARDS

	1973	1974	1975	1976	1977	1978	1979	1980
ARMY								
TOTAL $ AWDS	$1,285	$1,349	$1,279	$1,273	$1,506	$1,994	$1,805	$1,836
SB $ AWDS	107	108	107	107	70	81	92	105
SB %	8.4	8.0	9.0	8.4	4.7	4.1	5.1	5.7
NAVY								
TOTAL $ AWDS	$2,084	$1,700	$1,720	$2,136	$2,351	$2,369	$2,630	$2,696
SB $ AWDS	97	120	123	123	161	186	184	206
SB %	4.6	7.1	7.1	5.8	6.9	7.9	7.0	7.6
AIR FORCE								
TOTAL $ AWDS	$2,287	$2,099	$2,697	$2,620	$3,059	$2,940	$2,749	$3,332
SB $ AWDS	68	72	87	81	110	136	139	173
SB %	3.0	3.4	3.2	3.1	3.5	4.7	5.1	5.1
OTHER								
TOTAL $ AWDS	*	*	*	*	$205	$255	$323	$370
SB $ AWDS					50	69	87	101
SB %					24.3	27.1	27.0	27.3
TOTAL								
TOTAL $ AWDS	$5,656	$5,148	$5,601	$6,028	$7,121	$7,829	$7,508	$8,234
SB $ AWDS	272	300	316	311	389	474	502	584
SB %	4.8	5.8	5.6	5.2	5.5	6.1	6.7	7.1

$ IN MILLIONS

*FIGURES INCLUDED IN ARMY

Enclosure 5

DOD RESEARCH AND DEVELOPMENT OUTREACH PROGRAM

Bidders Mailing List

The DoD is involved in several actions in order to assist the small R&D firm. One is to get the "word" out to the small R&D businessperson as to how to do business with DoD, which DoD activities purchase what kinds of R&D and who small firms can contact for assistance. The key to increasing awards to small R&D firms is the assurance that an increased number of small firms can be expected to bid on DoD R&D procurements. This can be enhanced by having as many small firms as possible make application to be included in the Bidder's Mailing List of DoD procuring activities.

Federal Procurement Conferences

DoD is also actively engaged with the Department of Commerce in supporting the Federal Procurement Conferences which are sponsored by individual members of Congress in their local districts or states. At each of these conferences, DoD provides a senior Small Business Advisor from one of the Military Services or the Defense Logistics Agency as well as other DoD representatives from DoD activities located in the proximity of the Congressional member's constituency.

Enclosure 6

These DoD personnel provide information on how to do business with the military. Businesspersons are given copies of the booklet "Selling to the Military" which tells them what products and services each of our activities buys and what procedures must be followed to be placed on our bidders' mailing list. This publication also includes a separate section on Research and Development listing our R&D activities, what they buy, and how to prepare an unsolicited proposal. DoD also publishes a booklet listing each of our approximately 700 Small and Disadvantaged Business Specialists by their assigned procurement activity and location. These individuals not only assist businesspersons desiring to obtain procurements but more important, they screen procurements over $2,500 to determine if it can be set-aside for exclusive small business participation. Additionally, all of the Military Services distribute publications which treat their requirements in greater detail.

DoD Technical Advisors

A specific senior technical individual at each of the DoD laboratories has been assigned as one of his duties to help small business obtain research and development contracts. Individuals so assigned work with the small business specialists in terms of offering advice on R&D matters, such as identifying the particular engineer who is most familiar with a forthcoming R&D procurement. This is part of our continuing efforts to involve technical personnel in the small business program.

Commerce Business Daily Synopsis

Forthcoming procurement requirements valued in excess of $10,000 are synopsized in the Commerce Business Daily (CBD). Notices are also published of every contract award valued in excess of $100,000 which provides small firms the opportunity to compete for subcontract awards.

R&D Information

The Military Services conduct advanced planning briefings for industry to inform them of what products, services or techniques will be sought in the near future. The Navy has established two NARDIC's (Navy R&D Information Center), one on each coast which includes Air Force representation. These offices make information regarding R&D planning and requirements available to small business. The Navy has also established a NICRAD (Navy/Industry Cooperative R&D) Program ~~which furnishes~~ scientific and technical information on the operational capabilities and requirements of the U.S. Navy to non-government activities on a cooperative, no-cost contract basis.

R&D Sources Sought

It is DoD policy to utilize the R&D Sources Sought Section of the Commerce Business Daily, whenever practical, to seek additional small business sources for R&D procurements anywhere from three to six months in advance of the actual procurement. This technique is particularly helpful to small business firms. It gives them an opportunity to respond, by submitting technically qualifying information, to any synopsis in which they have an interest and a capability to satisfy.

Technology Transfer

It is the policy of the DoD to promote military-civilian technology transfer and cooperative development. This policy encompasses (1) the transfer of technology developed by DoD activities for national defense purposes to the civilian sector where such technology can be profitably utilized non-military applications, and (2) the identification of coming technologies of both military and civilian interest and the exploration of the feasibility for cooperative funding and for development of such technologies.

We accomplish this primarily through our Defense Documentation Center (DDC). DDC assists these Government contractors -- and potential Defense contractors -- by supplying technical reports of completed R&D efforts as well as summaries of ongoing R&D projects. These services are available to all U.S. Government activities and to their contractors, subcontractors and grantees -- regardless of size.

The systematic and timely availability of these technical reports and current project summaries helps significantly to prevent or reduce unnecessary duplication of R&D project work and to accelerate the completion and application of research information in order to shorten the "concept-to-delivery" cycle.

The DDC technical document collection totals more than a million different titles, covering all areas of science and technology. Information in these reports could enhance the efforts of aerodynamicists, chemists, mechanical engineers, psychologists, ecologists, or any other person with the Federal R&D community.

There are thousands of summaries in the Center's Work Unit Information System which answer the who, what, when, where and how concerning ongoing, Defense-sponsored, R&D efforts. Included is a narrative description of each effort, its purpose, costs and the activities responsible (with names and telephone numbers of key personnel).

Organizations registered with DDC have access to a variety of products and services. Most of these services are provided free of charge, while very nominal fees are imposed on others.

DDC receives all Defense-related reports with classifications ranging from unclassified to Secret and Restricted Data; however, not all reports are processed at this facility. DDC's responsibility includes the processing, announcing, storing, and distributing of classified and unclassified/limited reports. By a contractual arrangement, DDC forwards all unclassified/unlimited Defense reports to the National Technical Information Service (NTIS), Department of Commerce, where they are made available for sale to DDC users and the general public.

Unclassified reports of on-going projects are provided the Smithsonian Science Information Exchange (SSIE) for sale to the public. The Navy is also publicizing patents available for licensing through the use of exhibits.

The Army and Air Force also conduct similar operations as I have described for the Navy.

Department of Energy
Washington, D.C. 20585

February 8, 1982

RECEIVED
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COMMITTEE ON SCIENCE
AND TECHNOLOGY

Honorable Don Fuqua
Chairman, Committee on
Science and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This responds to your request of November 30, 1981, for Department of Energy (DOE) views on H.R. 4326 and S. 881, bills designed to improve the opportunities for small, innovative firms in federally funded research and development (R&D). It supplements testimony presented on January 26 before your committee by Mr. Hillary Rauch, the Department's Director of Procurement and Assistance Management.

The President endorsed S. 881 in a letter dated October 6, 1981, to Senator Warren Rudman. DOE likewise endorses S. 881. DOE opposes the enactment of H.R. 4326, however, because it deviates significantly from the approach of S. 881. Examples of these deviations are:

- The three percent funding level of H.R. 4326 risks compromising the scientific quality of projects;
- H.R. 4326 fails to exclude in-house research from the R&D base;
- H.R. 4326 does not place a cap on the contribution for basic research or R&D in government-owned, contractor-operated (GOCO) facilities;
- H.R. 4326 substitutes SBA for OFPP as the body responsible for policy coordination of the SBIR Program;
- H.R. 4326 mandates outside peer review for phase II proposals rather than providing flexibility on this issue;
- H.R. 4326 uses the term "budget" instead of "obligations" as the measure for the level of agencies' research and development. Because the Federal Procurement Data System records "obligations", use of this terminology is preferable; and

- H.R. 4326 does not contain a provision requiring the Comptroller General to evaluate longer-term significance of research conducted under SBIR programs.

Enclosed are specific answers to the three areas of inquiry in your letter to the Secretary dated November 30, 1981.

The Office of Management and Budget advises that, from the standpoint of the President's program, there is no objection to the submission of this report for the consideration of the committee.

We appreciate the opportunity to present our views on proposed legislation so vital to the interests of the small business, high technology sector.

Sincerely,

R. Tenney Johnson

R. Tenney Johnson
General Counsel

Enclosure

ANSWERS TO SPECIFIC INQUIRIES

The following material deals sequentially with the three areas of inquiry.

1. Brief Description of Existing Practices for Complying with Applicable Statutes Relating to Small Business

The principal statutes relating to small and minority small business that affect the Department are the Small Business Act (15 U.S.C. §631 et seq.); section 204(a) of Pub. L. No. 95-238, Department of Energy Act of 1978, Civilian Applications; section 641 of Pub. L. No. 95-619, National Energy Conservation Policy Act; Pub. L. No. 96-354, the Regulatory Flexibility Act; and Pub. L. No. 96-517, amending the patent and trademark laws.

By agreement between Lillian Trippett of your committee staff and DOE representatives, we are limiting our discussion to practices for determining goals for small business participation in Federal procurements imposed by Pub. L. No. 95-507, which significantly amended the Small Business Act. Our most recent "Report to the Congress on Small Business" (Enclosure 1) details procurement-related and programmatic activities targeted to small and disadvantaged technology-based companies.

The DOE's Office of Small and Disadvantaged Business Utilization (OSDBU) was established in accordance with Pub. L. No. 95-507. The primary mission of this office entails:

- Program management of DOE's activities on behalf of small business, disadvantaged business, labor surplus area concerns, and women-owned enterprises.
- Apprising DOE management of needed changes in policy, procedures, and opportunities to better represent socio-economic constituencies.

Sections 15(g) and (h) of the Small Business Act (copy enclosed) contain requirements for each Federal procuring agency to establish goals for participation of small and disadvantaged businesses in the procurement contracts of the agency. In accordance with those sections, the Department sets procurement goals for small and disadvantaged businesses. It also sets goals for set-asides to labor surplus area firms and for awards to women-owned enterprises. Since formalized goals under Pub. L. No. 95-507 were first adopted in Fiscal Year 1978, the Department has set progressively higher goals each year for total small business awards and has exceeded them every year. Moreover, small business procurement from all sources, prime and subcontract, has grown from $1.234 billion in Fiscal Year 1978 to $1.871 billion in Fiscal Year 1981, a 51.6 percent increase.

To comply with statutory goal requirements, the Department sets forth a rigorous milestone completion schedule to assure timely goal setting and periodic monitoring of accomplishments. The following table summarizes proposed departmental activity in 1982.

1982 DOE Milestone Completion Schedule For Small Business Goals

	Actions	Scheduled Completion
1.	Issue annual "call" for next fiscal year's goals, together with detailed guidance and timetable.	6/15/82
2.	Next fiscal year's goals submitted to the Director, OSDBU, by each program and field office.	7/30/82
3.	Small business, disadvantaged business, labor surplus area, and women business enterprise goals reviewed by OSDBU.	8/1-8/15/82
4.	OSDBU prepares and submits goals to the Small Business Administration (SBA)/the Office of Federal Procurement Policy (OFPP)/the General Services Administration (GSA).	8/30/82
5.	OSDBU negotiates goals with SBA/OFPP/GSA.	9/15-9/30/82
6.	DOE advised of next fiscal year's goals approved by SBA/GSA.	9/30/82
7.	The Office of Program Support and OSDBU participate in goal reformulation, if necessary.	10/1-10/30/82
8.	OSDBU disseminates current approved DOE-wide internal goals to all program and field offices.	10/30/82
9.	Obtain current fiscal year's procurement plans from program offices.	10/30/82
10.	Monitor goal implementation, on a monthly basis, with each field and procuring activity. Provide quarterly reports.	12/31/82

2. A Concise Statement of the Additional Personnel, Time, and Other Budgetary Amounts Required to Implement both H.R. 4326 and S. 881

S. 881

In our recent submission of estimates for S. 881 implementation costs to the Congressional Budget Office (Enclosure 2) we assumed a constant $5.8 billion R&D budget for each fiscal year after Fiscal Year 1981. Estimates of Small Business Innovation Research (SBIR) awards were based on the percentages in S. 881 as introduced; a formula associated with such calculations was later added in the S. 881 markup. Personnel and other costs associated with S. 881 are shown below at the phased levels of o.2 percent, 0.6 percent, and 1 percent. Our estimates were based on comparative inputs from discussions with representatives of the National Science Foundation and the Department of Defense.

The $5.8 billion figure was derived from Fiscal Year 1980 figures. Estimates for Fiscal Year 1982 provide an R&D budget figure of $5.077 billion which is used in the estimates relating to H.R. 4326.

ESTIMATED COSTS TO IMPLEMENT S. 881

Fiscal Year	Percentage	Estimated SBIR Awards In $ Millions	Additional Personnel Required *	Travel, Training & Publications	Total Costs
1982	0.2	12	$195,000 3 professionals 1 secretary	$60,000	$255,000
1983	0.6	35	255,000 4 professionals 1 secretary	70,000	$325,000
1984	1.0	58	333,000 5 professionals 2 secretaries	90,000	$423,000

* Includes 50 percent overhead. Management personnel only.

H.R. 4326

Our estimates for implementation costs of H.R. 4326 assume that the level of R&D expenditures will remain constant over the period at a level of $5.077 billion for budget authority. This figure is our most recent estimate (October 29, 1981) for Fiscal Year 1982.

ESTIMATED COSTS TO IMPLEMENT H.R. 4326

Full Year After Enactment	Percentage	Estimated SBIR Awards in $ Millions	Additional Personnel Required *	Travel, Training & Publications	Total Costs
1	0.5	25.4	$195,000 3 professionals 1 secretary	$60,000	$225,000
2	1.0	50.8	$333,000 5 professionals 2 secretaries	$90,000	$423,000
3	2.0	101.5	"	"	"
4	3.0	152.3	"	"	"

* Includes 50 percent overhead. Management personnel only.

3. A Discussion of How the Practices Set Forth in 1. Above Would be Modified to Carry Out the Provisions of H.R. 4326 and S. 881 if Enacted

If the SBIR program is enacted at levels dictated in S. 881, the Department's SBIR Program will complement existing practices described in this attachment (Question 1) and in the enclosed annual Report to the Congress on Small Business. Further, we expect to benefit from experience gained in conducting SBIR-equivalent programs, the Energy-Related Inventions Program and the Appropriate Technology Small Grants Program.

An SBIR program enacted at the levels dictated in H.R. 4326 would be incompatible with the types of high risk, long term technology programs conducted by DOE which are heavily weighted toward defense and nuclear funding. For example, in nuclear fission, magnetic fusion and defensive weaponry R&D activities, the opportunities for small business participation are extremely limited because of the size and, in many cases, classified nature of equipment and facilities to support such R&D. By contrast, total R&D Fiscal Year 1982 budget authority for solar and fossil energy technologies, which offer substantially enhanced small business prime contract possibilities, represents only 14.3 percent ($727.2 million) of total departmental R&D. The Department may well find itself caught between two future trends: one where the budget could decrease the percentage of funds available for R&D most susceptible for small business participation and the other where small business goals would be increased.

In Fiscal Year 1980, the Department's small business share of R&D obligations (exclusive of GOCOs, Federal assistance, and interagency transfers) was 9.6 percent ($125.3 million), the highest level in the Federal Government and more than twice the average percentage achieved throughout the Government. In Fiscal Year 1981, comparable figures were 5.6 percent and $72.89 million. Again DOE exceeded the average percentage achieved throughout the Government. Despite this record, the 3 percent level of small business R&D contemplated in H.R. 4326 is 108 percent higher than our Fiscal Year 1981 total small business R&D for other than SBIR programs.

For your information, DOE's Fiscal Year 1982 budget is as follows:

($ in Millions)
R&D

DOE	Fiscal Year 1982
Basic Research	609.70
Applied Research	799.60
Development	2,884.60
R&D Facilities	783.10
Total R&D and R&D Facilities	5,077.00

In response to your request for any 1981 testimony on S. 881, we enclose a copy of testimony presented on July 15, 1981, by N. Douglas Pewitt, then Acting Director, Office of Energy Research, before the Senate Small Business Committee (Enclosure 3).

Enclosure 1

DEPARTMENT OF ENERGY REPORT TO THE CONGRESS ON SMALL BUSINESS UNDER PUBLIC LAW 95-238

The Department of Energy (DOE) submits its sixth report to the Congress as mandated in Section 204(b), Public Law (P.L.) 95-238, "Department of Energy Act of 1978, Civilian Applications." Excerpts of this statute relating to reporting requirements appear below:

> Section 204(a)—"In carrying out the programs for which funds are authorized by this Act, the Secretary of Energy shall provide a realistic and adequate opportunity for small business concerns to participate in such programs to the optimum extent feasible consistent with the size and nature of the projects and activities involved."
>
> Section 204(b)—"At least once every six months, or upon request, the Secretary of Energy shall submit to the appropriate committees of the House of Representatives and the Senate, a full report on the actions taken in carrying out subsection (a) during the preceding six months; including the extent to which small business concerns are participating in the programs involved and in projects and activities of various types and sizes within each program, and indicating the steps currently being taken to assure such participation in the future."

Section 203(e), P.L. 96-470, the Congressional Reports Elimination Act of 1980, consolidated semi-annual reporting requirements imposed by Section 204(b), P.L. 95-238 and annual small business/nonprofit reporting required by Section 308 of P.L. 94-187. Accordingly, the Department is furnishing, and will furnish by March 31 of each subsequent year, a single annual report covering small business program management and nonnuclear, research, development and demonstration nonprofit obligations.

The Department's Small Business Report focuses attention on DOE programmatic and procurement elements which offer technology-based small business opportunities. The subject areas in our sixth report to the Congress are:

I. Office of Small and Disadvantaged Business Utilization

II. Office of Procurement Operations

III. Appropriate Technology Small Grants Program, Conservation and Solar Energy, CS

IV. Energy Related Inventions Program, CS

V. Office of Industrial Programs, CS

VI. Office of Small Business, CS

VII. Office of Solar Applications for Buildings, CS

VIII. Office of Solar Applications for Industry, CS

IX. Office of Solar Power Applications, CS

X. Office of Transportation Programs, CS

XI. Energy Information Administration

XII. Office of Energy Research

XIII. Economic Regulatory Administration

XIV. Office of Environment

XV. Office of Fossil Energy

XVI. Office of International Affairs

XVII. Office of Nuclear Energy

XVIII. Office of Minority Economic Impact

XIX. Office of Resource Applications

XX. Nonnuclear Research, Development and Demonstration Funding with Nonprofits

I. Office of Small and Disadvantaged Business Utilization

The Office of Small and Disadvantaged Business Utilization (OSDBU) was established to meet statutory provisions contained in Section 221, P.L. 95-507, Amendments to the Small Business Act and the Small Business Investment Act of 1958, which was enacted October 24, 1978. The principal responsibilities of this office are:

- Implementation and execution of DOE activities on behalf of small business, disadvantaged business, labor surplus area firms, and women-owned enterprises.

- Ensuring that DOE executive leadership is apprised of needed changes in policy or procedures, and/or opportunities to better serve its socio-economic constituencies.

DOE Procurement from Small Business (SB) and Disadvantaged Business (DB)

According to fiscal year-end statistics, the Department procured $1.798 billion from small companies and awarded $268 million to disadvantaged businesses for the period October 1979 through September 1980. These levels, according to initial calculations, surpassed the goals set by the Department ($1.491 billion SB and $250 million DB) by $307 million and $18 million, respectively. Fiscal year 1980 results are considerably higher than previous fiscal year performance in which small businesses received $1.322 billion and disadvantaged businesses $131.4 million.

Small and disadvantaged business statistics include volume from all sources, prime and subcontract.

Small and Disadvantaged Business Goals Approved for Fiscal Year 1981

Section 221 of P.L. 95-507 provided for the establishment of Federal agency goals "... for the participation by small concerns and by small business owned and controlled by socially and economically disadvantaged individuals, in procurement contracts of such agency having values of $10,000 or more. Goals established ... shall be jointly established by the Administration qnd the head of each Federal agency and shall realistically reflect the potential of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals to perform subcontracts under such contracts."

The chart below represents the initial fiscal year 1981 goals as approved September 1980, by the Small Business Administration (SBA) and, in the case of labor surplus area set-asides, by the General Services Administration (GSA). These goals will be adjusted to reflect budget rescissions.

DOE Fiscal Year 1981 Socio-Economic Procurement Goals

($ in 000)

Total Small Business Goal	$1,617,000
• Prime Awards Over $10,000	340,000
• Government-Owned, Contractor Operated facilities (GOCO) Subcontracts	978,000
• Non-GOCO Subcontracts	299,000
Total Disadvantaged Business Goal	300,000
• 8(a) Contracts	75,000
• Prime Non-8(a) Contracts	15,000
• GOCO Subcontracts	138,000
• Non-GOCO Subcontracts	72,000
Total Women-Owned Business Goal	15,000
Labor Surplus Area Set-Asides	180,000

Task Force on Minority Business

Early in the second quarter of fiscal year 1980, it became clear to the Secretary that the Department's efforts to expand participation in its procurement program by minority business enterprises (MBEs) were stalled. It was also clear that the DOE goals established to foster such an expansion were not challenging enough to be effective. Accordingly, on March 7, 1980, the Department initiated corrective action. First, the Secretary discarded the original fiscal year 1980 MBE goal of $156 million, and projected a new goal of $250 million. This increased the target percentage of MBE participation from 2.1 percent to 3.8 percent. The SBA had earlier suggested a DOE 8(a) goal for fiscal year 1980 of $32 million. Secretary Duncan raised this to $86 million, an increase of $53.2 million over SBA's recommendation, and $54 million more than the Department had accomplished in fiscal year 1979.

The second initiative launched on March 7 was the creation by John A. Hewitt, Jr., the Chief Financial Officer, of a Task Force on Minority Business, charged with these basic missions.

- Coordinate actions taken by the Department to meet the new MBE goals. The Task Force would provide a central DOE clearing-house and pressure point on matters relating to MBE goals.
- Recommend ways in which MBE activity could be institutionalized and improved throughout the Department. (In effect, the Task Force would try to make MBE procurement so routine that there would be no need for future task forces.)

Seven professionals were detailed to the Task Force, which began operation on March 8 and concluded, with issuance of a draft report, on July 30. During this period, the group explored in depth the major programs and activities of the Department as they related to minority business. Members of the Task Force met at least twice with the head and/or deputy and key staff of each program office in Washington, D.C., and at least once with top officials of all the major field offices and larger Government-Owned, Contractor Operated facilities. The Task Force reviewed the manner in which each activity proposed to respond to its new goal; where this response was deemed unsatisfactory, the Task Force negotiated with that activity to obtain a higher level of effort.

In September, the draft Report of the Task Force was assigned to the Office of Small and Disadvantaged Business Utilization for action. Copies were distributed throughout the Department for comment, with specific attention focused on the Task Force recommendations in the areas of Goals, Source Identification, Outreach, Reporting, Subcontracting, and Orientation and Training. Implementation of approved recommendations is scheduled for calendar year 1981.

Year-end data indicate that fiscal year 1980 awards to minority firms (prime and subcontract) totalled $268 million, more than double the fiscal year 1979 amount. Awards channeled through the 8(a) program totalled $103.7 million, more than triple the prior year record. Although it is not possible to define the precise relationship between these accomplishments and the work of the Task Force, it is obvious that some direct relationship exists.

Other agencies have assessed their overall MBE programs, usually in the form of an evaluation by a consulting firm. However, the DOE Task Force was unique both in the extent to which it closely examined programs and activities of a major Department, and in the fact that this effort was performed wholly in-house.

Secretarial Small Business Message

On January 13, 1981, the Secretary issued a memorandum to DOE Assistant Secretaries, Administrators, Directors, and the Chairman, Federal Energy Regulatory Commission, exhorting program personnel to utilize small and disadvantaged technology-based companies. The Secretary also underscored the dramatic growth of this procurement program since the inception of DOE in October 1977.

Procurement Automated Source System (PASS)

PASS is an automated data bank of small, disadvantaged, and women-owned businesses (SB/DB/WOB) accessed through remote terminals located at various Government and commercial locations throughout the United States. This system, jointly funded by the DOE and the SBA, has consistently grown since its inception in 1977. At present, PASS contains 40,889 SB/DB/WBE firms whose capabilities can be displayed at 65 terminals. The DOE has installed a total of 21 terminals at operations offices, the Strategic Petroleum Reserve and GOCO facilities. The DOE has the largest quantity of remote terminals in the Federal Government.

Procurement Preference Reviews

The Headquarters' Office of Small and Disadvantaged Business Utilization (OSDBU) conducts preference reviews or "screening" of individual procurement requests accompanied by "415" review forms originating from DOE Headquarters organizations. In fiscal year 1980, OSDBU-designated staff members analyzed 983 work statements contained in procurement requests valued at $1.4 billion in order to match requirements to capabilities of small businesses, disadvantaged businesses, and labor surplus area (SB/DB/LSA) concerns. This matching process is accomplished through consultation with programmatic outlay offices, retrieval from DOE's PASS terminal, active source files, and recent procurement history. Based on their analyses, OSDBU Small Business Specialists recommend small business/ labor surplus area set-asides or refer for 8(a) consideration. Field SB/DB Specialists conduct screening of procurement requests originating at field locations.

Due in large part to our transactional screening procedure, 8(a) awards rose from $32.4 million in fiscal year 1979 to $103.7 million in fiscal year 1980. During the same period, small business set-asides grew from $309.7 million to $418.6 million. LSA set-asides reached $74.3 million in fiscal year 1980, $30 million higher than in the previous fiscal year.

Unsolicited Proposal Reserves

In fiscal year 1979, the Department of Energy established the first Federal reserves for exclusive support of unsolicited proposals submitted by small or disadvantaged business concerns. The Offices of Conservation and Solar Energy and Fossil Energy set fiscal year 1981 SB/DB unsolicited proposal support levels at $300,000 and $750,000, respectively. Acceptance of unsolicited proposals is governed by DOE and Federal Procurement Regulations (FPRs) [DOE PR § 9-4.909 and FPR § 1-4.909(d)], including the following criteria:

- Unique, meritorious, methods, approaches, or ideas which have originated with or are assembled together by the offeror;
- Overall scientific, technical, socio-economic merits;
- Potential contributions to DOE mission; and
- Related experience and qualifications of key personnel.

Women-Owned Business

Executive Order 12138, issued in May 1979, established a national policy to foster women's business enterprise (WBE). In its guidance documents to the executive agencies on goal-setting, the Office of Federal Procurement Policy called for the inclusion of a WBE goal in the agencies' overall preferential procurement goals.

DOE's fiscal year 1980 goal was $3.5 million. Based on preliminary data, it appears that DOE will have exceeded that goal by several hundred thousand dollars. For fiscal year 1981, DOE established a prime contract goal of $7 million, and a GOCO subcontract goal of $8 million, a total of $15 million. In addition, DOE set an internal non-GOCO subcontract goal of $2.9 million. Thus, the fiscal year 1981 WBE goals, in the aggregate, represent a five-fold increase over fiscal year 1980 performance.

To assist the Department's WBE program, a grant was awarded in September 1980 to the National Association of Women Federal Contractors (NAWFC), under which that organization--through extensive mailings and telephone surveys--will identify those WBEs potentially capable of participating in DOE procurements. Further, the NAWFC will develop specific source lists tailored to each major DOE program, i.e., Fossil Energy, Nuclear Energy, Defense Programs, Conservation and Solar, etc.

II. Office of Procurement Operations (PR-50)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

In carrying out the mandates of P.L. 95-507, the Office of Procurement Operation's Small Business Specialist, upon receipt of subcontracting plans, contacts apparent successful proposers to offer assistance in locating additional small/disadvantaged firms in order to increase their goals and increase the likelihood of achieving their goals. Response has been encouraging, in that about 25 percent of those contacted have increased their goals; however, achievement will be measured after quarterly reports are tabulated. P.L. 95-507 also specifies that small purchases (under $10,000), with limited exceptions, be set-aside for small businesses. To insure that all small purchases are, in fact, set aside for small businesses, the resident Small Business Specialist monitors awards on a monthly basis, and has found the Office of Procurement Operations to be in full compliance with public law.

Representatives of firms visiting the office of the Small Business Specialist are counseled and alerted to the work of the various DOE program offices, are advised as to new legislation that may affect their businesses, and encouraged to register with the PASS system.

Progress in Areas Identified in Previous Reports

The "zero-status" listing continues to be generated. This Integrated Procurement Management Information System (IPMIS) listing identifies new procurement requests (PRs) on which no action has been taken, and is reviewed weekly by the Small Business Specialist for suitable SB/DB procurements. For fiscal year 1980, this generated approximately $8 million in procurements converted to 8(a).

Subcontracting incentives have not progressed as well as the DOE Policy Office had hoped. Prime contractors are reluctant to subcontract when they can perform the work in-house; items subcontracted have generally been supplies or utilities which were not obtainable from SB or DB firms. An additional eight PRs identified for subcontracting incentives by the PR-50 Small Business Specialist are being pursued.

Extent of Small Business/Disadvantaged Business Participation

Involvement includes contacts made by SB/DB firms to the PR-50 Small Business Specialist by visit or by telephone, submission of capability statements, applications to PASS, and brochures to familiarize prospective contractors with DOE programs.

A system of personal presentations was set up by the Small Business Specialist, with the cooperation of PR-50 personnel, in which suitable firms were interviewed by DOE program representatives for various projects. Capabilities were displayed and there was opportunity for direct dialogue between project managers and firms.

Using these procedures, PR-50 was able to surpass its fiscal year 1980 small business goal by 11.9 percent ($168.8 million) and its disadvantaged business goal by 41 percent ($54.4 million).

Barriers to Small Business/Disadvantaged Business Participation

The chief barrier is unfamiliarity of program offices with SB/DB firms. Once a firm's capability is known, there is greater acceptance on the part of program officials to utilize SB set-asides or 8(a) procedures. The system of personal presentation set up with program offices is accomplishing this objective.

III. Appropriate Technology Small Grants Program, CS

Appropriate Technology Small Grants Program, Conservation and Solar Energy

Appropriate technology has many meanings and applications. Generally, it can be described as the technology or process which is most appropriate for local, cultural, economic, and social conditions. For purposes of DOE's small grants program, grants, cooperative agreements, or contracts may be made to or with small businesses, individuals, local nonprofit organizations and institutions, State and local agencies, and Indian tribes. The involvement of small companies is compatible with and critical to small scale, appropriate energy technology.

In terms of resources, Appropriate Energy Technology:

- Makes best use of available renewable energy sources;
- Conserves nonrenewable resources;
- Depends largely on human labor; and
- Maximizes use of local materials and labor skills.

In scale and efficiency, Appropriate Energy Technology:

- Is efficient in its use of energy and other resources;
- Is compatible with community regulations;
- May employ scaled-down industrial technology; and
- Employs novel applications of existing technologies.

In relation to the end-user, Appropriate Energy Technology:

- Satisfies local needs;
- Increases community energy understanding and self-reliance; and
- Results in durable, recyclable systems and/or products.

The rulemaking published on August 8, 1978, defines an eligible small business as a concern, including affiliates, which is organized for profit, is independently owned and operated, not dominant in the field in which it submitted a proposal to DOE, and whose number of employees does not exceed 100 persons.

Small businesses have played a significant role in the Small Grants Program. Since 1978, the program has provided 318 grants to small businesses. This represents over 21 percent of all grants awarded between fiscal year 1978 and fiscal year 1980. Small businesses have also received generally higher grant awards than other program recipient groups such as individuals and nonprofit organizations. The average grant award made to small business was approximately $16,840 in fiscal years 1979 and 1980. An estimated 28 percent of all grant monies awarded during this period also went to small businesses.

IV. Energy Related Inventions Program, CS

The Inventions Program provides first, for evaluation of inventions by the Office of Energy-Related Inventions (OERI) in the National Bureau of Standards (NBS), Department of Commerce; and then, support by the DOE of inventions identified by NBS as promising. It gives particular attention to small businessmen and individual inventors, and provides one-time assistance, usually in the form of grants to assist the NBS-recommended inventors in developing or commercializing their inventions.

Through the end of September 1980, OERI had received a total of 15,702 evaluation requests. They made decisions on 14,938 of these, and recommended 153 inventions to the DOE. As of that date, the DOE had awarded 86 grants or contracts totalling $5,818,416. Thirty-three of these grants are now complete. Five other inventors have received support other than direct financial assistance, and in 11 cases there was no feasible way for DOE to help the inventor. Negotiations are in progress with the remaining 51 inventors to determine the activities to be supported with DOE assistance.

The Inventions Program is being recognized as a unique approach to stimulating invention and innovation in energy technologies by the small business community. The Program is achieving a favorable impact in three ways described below.

(1) Commercialization of Recommended Inventions. Inventions recommended by NBS and supported by DOE are now reaching the marketplace and in many cases achieving significant success. Four examples follow; in each case energy, economic, and societal benefits are substantial.

Heat Extractor

In May of 1978, Dan Ben Schmuel's "Heat Extractor" was recommended to DOE. He was given a $125,000 grant for a cooperative demonstration at the Mohawk Paper Company. The unit was very successful, and worked as planned. With the aid of the DOE and NBS reports, Mr. Schmuel has been successful in selling the heat extractor. This device is a direct contact heat exchanger that uses "waste" heat for heating water. This unit has been installed at several hospitals and hotels. It heats water to a maximum of about 180 degrees F. It has also been found very useful in certain process industries that require large amounts of hot water, such as paper mills. The employees at the plant have increased from 20 to 150, and the company has a backlog of several million dollars of heat exchanger orders. Mr. Schmuel states that the NBS report "explained" the operation of the Heat Extractor and was instrumental in allowing him to sell the device.

Eldon Heater

Mr. Harry Wood's invention was recommended to DOE in December 1977 and received a $77,000 grant for demonstration of his hot water heater in a 210-unit apartment building. The test of the "Eldon" heater was very successful. It is gas fired, has an efficiency of about 99 percent based on the higher heating value of the gas and is primarily useful in apartment, commercial, or industrial applications. The device has been successfully installed and used in about seven units in New Orleans and is approved by at least the New Orleans and Seattle Boards of Health. Very recently, Mr. Wood concluded a license agreement with A. O. Smith (second largest hot water heater manufacturer in the United States) and expects a patent to be issued soon. Mr. Wood tells us that the DOE/NBS program helped him to achieve credibility and demonstrate the usefulness and energy savings of his device.

Solaroll

Michael Zinn's invention "Solaroll" was recommended to DOE in March of 1979. This invention is a low-cost extruded-plastic solar collector suitable for mass production. Prior to recommendation to DOE, NBS had written that Mr. Zinn should approach the SBA and noted that the invention was technically sound. With that letter Mr. Zinn was able to negotiate a $500,000 loan from SBA to enable him to equip his shop for higher production of the

"Solaroll." With that loan and a subsequent grant from DOE to test and demonstrate the unit, Mr. Zinn has continued to expand his business. In calendar year 1980, his sales were approximately $8 million, and he projects $16 million in 1981. He has been and is in the process of negotiating many foreign licensing agreements.

U-Form Technology

Melvin H. Sachs' invention "U-Form Technology" was recommended to DOE in August 1978 and received a $87,230 grant for testing to support marketing. The U-Form Technology uses rigid lightweight aggregate insulation to provide the form works for the concrete structural members of a building. Preformed panels make up the interior and exterior wall surfaces of the building when it is completed. The technology not only reduces energy but also reduces construction costs and time. It is estimated to cut construction time by one-third or more and permits year-around workability of concrete without freezing. In one instance, Detroit Edison found the actual billings for total energy costs in a 120,000 square foot building in Livonia, Michigan, (U-Form Headquarters) averaged only $0.63/foot squared for all energy consumed during 1978 through 1979. This compared with Detroit Edison's own projection of $1.00 to $1.25/foot squared for other thermally efficient but more conventionally constructed buildings. Several other buildings have been built by this process including a 232-unit Housing and Urban Development (HUD) complex for the aged in Detroit, a 196-unit HUD building in Livonia, and a 151-unit apartment building in Ypsilanti, Michigan. Sponsorship by the DOE/NBS program was instrumental in U-Form's receiving top honors in a competition for "significant achievement in technological development" at the Eighth Annual World's Fair for Technology Exchange in Atlanta last February, and is seen to be a significant factor in Mr. Sachs increasingly successful marketing efforts.

(2) Utilization of Evaluation Results on Nonrecommended Inventions. When an invention is turned down by NBS, the inventor receives an evaluation report containing the results of the evaluation. Frequently, the report is supplemented by considerable technical discussion with the NBS staff evaluator. This technical service can be of significant value to the inventor particularly as noted below.

Of the first 100 inventions recommended to DOE by NBS, 12 had been originally rejected in the evaluation process. In many of these cases, the NBS evaluation report stimulated the inventor to modify the original design, achieving an improvement which resulted in a recommendation when the inventor resubmitted the invention to NBS.

The evaluation report frequently indicates that the invention, or new energy-saving product, is technically sound and commercially competitive, even though the energy impact or uniqueness is not sufficient to warrant recommendation under the Invention Program. This establishes credibility of the inventor or small firm; and frequently has enabled him to obtain support or assistance from other private or public sector sources. In selected cases of this type, NBS writes a special form letter referring the inventor/small firm to the SBA or the Federal Supply Service (FSS) New Products Schedule Program (FSS referrals were initiated as a result of interaction with the Products Working Group of the "656" Committee). Approximately 60 such referrals have been made by NBS, and the appropriate linkage has been made with these two agencies to insure that the referred product receives appropriate consideration.

(3) Information Dissemination. A principal finding of the Invention Program is that the independent inventor and the very small business firm do not have adequate access to technical information on the state-of-the-art in most technologies, are not knowledgeable on practical aspects and difficulties of the innovation process, and are frequently not aware of Government and private sector programs established to assist small business. A number of initiatives have been taken to rectify these deficiencies with the expectation that the end result will be increased volume and quality of inventions submitted to the Program. The initiatives described below constitute another form of direct support provided to inventors through the program.

A conference series called National Innovation Workshops (NIW) has been inaugurated to provide practical guidance and information to inventors and innovative small businesses throughout the Nation. The conferences feature workshops on topics such as: turning ideas into inventions, patenting and protection, licensing and selling inventions, and new business start-up. The attendees are informed and materials distributed as to sources of consultation and financial assistance, and sources of technical and socio-economic information. The general theme of these conferences is to encourage innovation in energy technologies.

Five NIWs were held during 1980 in San Francisco, California, Boston, Massachusetts, Atlanta, Georgia, Arlington, Texas, and Philadelphia, Pennsylvania. Six are planned in calendar year 1981 to include Denver, Colorado, Minneapolis, Minnesota, Indianapolis, Indiana, and Seattle, Washington. NIW attendance has ranged from 250 to 500.

Grants have been awarded to Patent Depository Libraries in Sunnyvale, California, Boston, Massachusetts, and Atlanta, Georgia, to establish Inventor Information Resource Centers. Funds are to be used to enable computer accessing of technical data bases by inventors and small businesses, and to disseminate information of particular interest to that population.

The Program is actively supporting formation of and communication among inventor organizations. The objective is development of an organizational network which will serve as a channel of communication for disseminating information to inventors. A grant has been awarded to the American Association of Engineering Societies to establish feasibility and determine potential value of a National Congress of Inventor Organizations which would operate as an "umbrella" organization with local or State groups as members.

Special purpose publications are being developed to meet those inventor/small business needs which relate to invention in energy technologies. One publication "Federal Assistance for Energy Inventors" has been extremely popular and received very wide distribution.

(4) Operation Description

There are three principal steps in the evaluation process operated by the National Bureau of Standards' Office of Energy-Related Inventions (OERI). In the first step, Disclosure Review and Analysis, invention disclosures received are either accepted for evaluation, or not, dependent on whether the invention is within program scope and sufficiently well prepared to enable evaluation. If accepted, a two-stage evaluation is initiated.

First-stage evaluation is a technical screening in which brief technical opinions are obtained, usually independently, from OERI staff evaluators, other Government scientists or engineers, or from consultants or contractors. If the invention is rated as "promising" in this first-stage, second-stage evaluation is initiated; "promising" means the invention seems to be technically feasible, to have significant energy conservation or supply potential, and to be economically and commercially practical.

In second-stage evaluation, a more in-depth analysis is conducted, resulting in a formal report. If second-stage evaluation confirms the finding of "promising," the disclosure and evaluation results are forwarded with a recommendation of Government support to the DOE, Office of Small Scale Technology, Invention Support Division.

Throughout the process the inventor is kept informed of the status of the evaluation. When evaluation is complete after either first or second-stage, a letter is sent to the inventor explaining the results of the evaluation. If second-stage evaluation has been conducted, a copy of the formal evaluation report is sent to the inventor.

V. Office of Industrial Programs, CS

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation:

According to year-end projections, the Office of Industrial Programs' four percent small business goal was exceeded.

Extent of Small Business/Disadvantaged Business Participation

A list of projects which are being performed by small business contractors for the Office of Industrial Programs follows this narrative.

Barriers to Small Business/Disadvantaged Business Participation:

In general, the Office of Industrial Programs deals with highly complex, capital intensive, industrial processes which few small businesses can undertake on a prime contract level.

PROJECTS BEING PERFORMED BY
SMALL BUSINESS CONTRACTORS FOR THE
OFFICE OF INDUSTRIAL PROGRAMS, C&S

Procedyne---------------------------Atactic Polypropylene

-Heat Treating of Metals

Varigas-----------------------------Powered Hand Tool Demonstrations

Merix Corp.-------------------------Energy Conservation in Distillation

Terra Tek, Inc.---------------------Recuperators

EDC---------------------------------Air/Fuel Ratio Control Development

OAO Corp.---------------------------Milestone Tracking System

-Energy Efficiency of Industrial Equipment

Hague International-----------------Slot Forge Furnace Development

Centec Consultants------------------Citrus Data Base

-Environmental Development Plan

MTI---------------------------------High COP Heat Pump

Cyclomatic, Inc.--------------------High Efficiency Arc Welding

Alpha Glass-------------------------Brayton Cycle--Glass and Cutting Tool Coatings

Concentration Specialists-----------Freeze Crystallization

Valley DeHi-------------------------Advanced Dehydration Demonstration

International Preheater-------------Steel Scrap Preheater

Keller Engineering------------------Improved Energy Efficiencies in
Agricultural Irrigation Systems
(PON 5000)

Prossen Industries------------------Improved Energy Efficiencies in
Agricultural Irrigation Systems
(PON 5000)

Aerospace Research Corp.------------Improved Energy Efficiencies in
Agricultural Irrigation Systems
(PON 5000)

Foster Miller Associates------------Improved Energy Efficiencies in
Agricultural Irrigation Systems
(PON 5000)

Energy Concepts, Co.----------------Oxygen Production by Chemical
Separation

Clemco Research---------------------Safety Analysis—Various Technologies

Par Enterprises---------------------Commercial Heat Exchanger Survey

Uintex------------------------------High Temp Counter Flow Recuperator

CR&L/Neochem------------------------Joint Novel Process for MTBE

A. Smith Bowman Dist.---------------Ethanol and Food Grade Fermentation

Adcor-------------------------------Plating Waste Disposal

Sumx Corp---------------------------Energy Integrated Farm

Fertile Farms, Inc.-----------------Energy Integrated Farm

Nelson Farms------------------------Energy Integrated Farm

Archbold Investment-----------------Energy Integrated Farm

General Energy Associates-----------Data Base for Existing and Potential
Cogeneration

Policy Planning Corp.---------------Analysis Recovered Materials

Ferguson, Bryan---------------------Utility Financing

VI. Office of Small Business, CS

Office of Small Business, Buildings and Community Systems, Conservation and Solar Energy

The Office of Small Business (OSB) has two missions which provide the basis for its programs and activities.

1. To ensure that the interests of small business are considered in the formulation and implementation of Federal energy policy and programs.

2. To ease the impact of energy-related problems by facilitating the delivery of assistance and information to small business.

Project Descriptions:

- Cost/Benefit Determination for Key Energy Policies as They Affect Small Businesses

  Purpose: To determine the impact of DOE policies on viable, energy-intensive small businesses from a cost-benefit perspective and to prepare a framework for analyzing future energy policies with regard to their impact on small businesses.

  Procurement: Small business set-aside

- Impact of Increasing Energy Prices and Energy Supply Curtailments on Small Businesses in the United States

  Purpose: To determine the impact on a national sample of small businesses with under 500 employees. The aim of the study is to create a five-sector data base on 5,000 small businesses. It will also identify the creative resources which these small firms have brought to bear in response to the current energy situation.

  Procurement: University of Pittsburgh, Energy Policy Institute

- Regional Voluntary Industry by Industry Energy Conservation Program

  Purpose: To demonstrate the efficacy of a local business community's effectiveness in establishing and operating its own energy conservation program.

  Procurement: Grant program

- Greater Washington Board of Trade

  Developed an energy conservation project model for business and industry in the metropolitan Washington, D.C., area. The implementation of this project has resulted in the development of a voluntary energy conservation program for businesses which can be used by DOE in cities across the country.

  Procurement: Grant program

- National Restaurant Association (NRA) Training

  Purpose: To develop train-the-trainers sessions for representatives from 31 States, who were equipped to return home and conduct workshops for individual restaurants. Of the 69 people attending, over 95 percent expect to be involved in conducting workshops. In preparation for the training sessions, NRA developed a thorough technical manual, as well as slide/tape presentation.

- Energy Extension Service (EES) Small Business Training

  Purpose: To develop train-the-trainers small business energy conservation sessions for EES representatives in five States. Three training sessions have taken place during the past six months, and two additional sessions will be conducted within the next four months.

Program Descriptions:

- The Small Business Energy Cost Reduction Program, the purpose of which is to provide technical assistance on cost-effective energy conservation recommendations to small businesses, has developed 14 sector-specific guidebooks. Four additional sectors, namely, plastics production, frozen food processing, scrap iron and steel, and private health care facilities, are being researched as the basis for guidebook development. Outreach efforts continue in conjunction with trade associations co-sponsors, SBA and DOE Energy Extension Services States.

- The Energy Partnership for American Cities Program is designed to bring together States, local governments, and the business sector to audit and retrofit small and medium size commercial buildings. It will also support the marketing of the 18 cost-effective energy cost reduction guidebook series to small business, through an interagency agreement with the National Science Foundation. A separate select city marketing approach is operating with management support from a small business contractor.

- New Technology Transfer for Small Business Application, is designed to inform small business owners of new technologies which are financially and technically suitable for their use. Management support: 8(a).

- Small Business Energy Management Demonstration Program. This demonstration program became operational on October 1, 1980. The two-year pilot demonstration program compares the feasibility and effectiveness of delivering energy management information and technical assistance to small businesses through four mechanisms. The demonstration compares programs conducted by single-city, statewide, multistate, and a national organization.

  Procurement: Grant program

VII. Office of Solar Applications for Buildings, CS

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

- The Office of Solar Applications for Buildings has established a policy that the Regional Solar Energy Centers (RSEC) will be utilized to the maximum extent possible in the execution of the Solar Applications for Buildings Program. The four regional centers themselves are managed by small business. During 1981, over $28,000,000 will be transferred to these four regional centers to conduct commercialization activities.

- The Solar Cities Project provides grants to cities and towns to become more energy self-sufficient by integrating solar and energy-conscious designs into their policy, planning, and development processes. Cities and towns then subcontract the majority of the grant monies to architects, installers, and construction firms that are primarily local small businesses. It is estimated that $1.5 million of the $2 million planned for this program will go to small businesses in 1981.

- The Department has negotiated agreements with 42 firms to provide design costs for commercial buildings. Some or all of the projects will be selected for help with construction costs, up to $150,000 per building in fiscal year 1981. Small business participation in this program is estimated to be 75 percent.

- DOE has also funded builders for manufactured or prefabricated buildings to help with designing, manufacturing, and marketing buildings that include passive or hybrid solar features. This program has approximately 25 percent small business participation.

- A new solicitation for new passive materials and components resulted in awards to 20 small businesses out of 22 firms selected. Activities in this program will continue into fiscal year 1983, with funding for fiscal year 1981 totaling $1.1 million. Other areas planned for small business participation are through the RSECs which interface with the public on a regional basis.

- The Active and Passive Heating and Cooling Systems Programs are planning to exceed the previous year's level of small business participation, with a commitment to allocate at least 20 percent of available funds in fiscal year 1981.

- The Solar in Federal Buildings Program (SFBP) which will continue into fiscal year 1981 estimates that $29.6 million of funds spent in fiscal years 1980 and 1981 for design installation and construction of active systems will flow to small businesses. This amounts to 80 percent of such funds.

- Small business set-asides for competitive solicitations will be considered in all cases, and at least two potential soliciations have been identified as small business set-asides.
- The Solar Energy Research Center (SERI), the Regional Solar Energy Centers (RSECs), and GOCOs will be required to report quarterly on small business participation with plans for increasing small business participation.

Progress in Areas Identified in Previous Reports

The Solar Energy Utilization/Economic Development and Employment (SUEDE) Program, which has been utilized to train workers and expand business development in depressed areas, has 15 pilot projects (six of which involve direct utilization of minority enterprises) underway and are reporting favorable results. Approximately 320 low-income participants are learning basic skills which involve the installation of over 900 solar systems on low-income housing.

The industry installer training program continued in fiscal year 1981. This program is aimed at accelerating the training of individuals within the solar industry to insure that competent solar equipment installers are available to this industry. Six major sheet metal training sites are being outfitted with solar systems to annually train 300 contractors in the Sheet Metal and Air Conditioning Contractor's National Association and 150 industry instructors. These instructors will then establish training programs at their 150 industry training sites where an estimated 11,250 solar installers/mechanics will be trained each year. It is anticipated that the majority of those trained will be employed in small businesses throughout the United States.

Extent of Small Business/Disadvantaged Business Participation

During fiscal year 1980, approximately 20 percent of funding in Solar Applications was awarded to small business. An effort is being made to collect SB/DB programmatic information from all laboratories and subcontracts.

VIII. Office of Solar Applications for Industry, CS

Division of Solar Thermal Energy Systems, Office of Solar Applications for Industry, CS

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

The Division of Solar Thermal Energy Systems (STES) now requires specific plans from its field organizations to be submitted as part of the annual operating plans. These plans are now being submitted. In addition, STES also requires reports on small/disadvantaged business participation as part of the quarterly review process.

Extent of Small Business/Disadvantaged Business Participation

Based on first quarter fiscal year 1981 figures, small business participation appears to be at least at the 12.7 percent level reported for fiscal year 1980.

Barriers to Small/Disadvantaged Business Participation

It is unlikely that small business participation in the program can be markedly increased above present levels. The program budget has been relatively unchanged and, at best, is likely to continue to be so. Thus, spending plans for fiscal year 1981, fiscal year 1982, and out-years will be based on completing on-going tasks and projects, employing primarily those companies which are presently under contract.

Division of Biomass Energy Systems, Office of Solar Applications for Industry, CS

Introduction

Biomass is a form of solar energy that is stored in a wide variety of plant and animal organic matter. Raw biomass materials can be transformed into fuel as well as steam, electricity, and heat. Biomass has both residential and industrial applications. It is the oldest source of energy known. People have burned wood for heat for thousands of years. Until the mid-1900s, wood was the main source of energy supply in the United States when it was replaced by the growing use of fossil fuel.

The objective of the Biomass Program is to develop alternative sources of energy, energy-related products, and chemicals from biomass in order to supplement fossil fuels and their derivatives. The near-term goal of the BES program is to make three quads per year available before 1985.

Extent of Small Business/Disadvantaged Business Participation

Before fiscal year 1980, participation in the BES program by small/minority businesses was less than 10 percent. In fiscal years 1980 and 1981, concerted efforts were undertaken by BES to increase the participation of small/minority businesses in the program. These activities include:

1. Implementation of a "Special Enterprise," Reporting Form--DOE procuring activities were asked to include this form in every contract. It is a report to be completed by the contractor after award. It requires his reporting not only on his own company, but also on any subcontractor's company. The form is returned to BES by the contractor, and manual records are maintained. This information will allow BES to report accurately on participation.

2. Prompt Payment of Vouchers--A cover sheet for small/minority business vouchers has been developed. It is hoped that this form will be in use by the middle of January 1981.

3. All contractors are informed of our small business goals for fiscal year 1981 during contract negotiations.

In fiscal year 1980, figures indicate BES reached a level between 15 and 17 percent in the form of awards contracted or subcontracted to small businesses. This estimate is based on responses from a request to all procuring activities for information on all 1980 awards made with BES funds.

Division of Biomass Energy Systems, Office of Solar Applications for Industry, CS

For fiscal year 1981, a goal of 20.1 percent has been set by the Deputy Assistant Secretary for Conservation and Solar Energy.

All requests for proposals (RFPs) going out of BES are reviewed to see if it is possible to set aside totally a portion for small/minority businesses; every funding letter to DOE facilities states that we have a goal for small/minority participation. These facilities assist in helping us to meet established goals. The Division of Biomass Energy Systems will continue to expand small/minority business participation in its program during fiscal year 1981 by continued emphasis and also by trying to improve communications between DOE and the small business community.

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

- A list of small/disadvantaged businesses by technologies has been requested from SBA. All program managers will review this list to determine if any part of their programs could be supported by small or 8(a) firms.
- The Biomass Energy Systems Division is using the pamphlet "DOE 8(a) Minority Contracting Program" as a method of disseminating information on how to do business with DOE if a firm has an 8(a) designation.
- Letters were sent to all field offices, laboratories, and regional offices stating the fiscal year 1981 goal of 20.1 percent and asking for their commitment to this goal.
- Working with the DOE, OSDBU staff to coordinate plans for seminars, workshops, etc.
- Frequent contact with the DOE field offices, particularly the San Francisco Operations Office.

Division of Biomass Energy Systems, Office of Solar Applications for Industry, CS

Progress in Areas Previously Reported

- Our "special enterprise" reporting forms (which include small business, 8(a), women-owned, labor surplus area) are now being submitted by contractors.

- Several staff members have been interviewed by Solar American regarding a catalogue of small business/disadvantaged businesses being prepared for CS.

- Two qualified 8(a) contractors have been identified for support services to the Division. The procurement authorization packages have been proposed and are in the concurrence cycle.

Extent of Small Business/Disadvantaged Business Participation

Our goal this fiscal year is 20.1 percent. A portion of the contracts will be in support areas with the balance in research and development (R&D).

IX. Office of Solar Power Applications, CS

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

The Office of Solar Power Applications (SP) has established an active small business program.

- In order to monitor all small/disadvantaged business activities, a single point of contact was established within SP and program divisions to coordinate all small business activities.

- For those programs decentralized to the field or another Federal agency, quarterly reporting has been requested by SP divisions of small/disadvantaged business participation. Upon receipt of the quarterly reports, the program divisions analyze data and take action to provide guidance to laboratories and/or agencies.

- For those projects funded out of Headquarters, requirements are reviewed to determine services which could be performed by small/disadvantaged businesses.

Progress in Areas Identified in Previous Reports

- Small/disadvantaged businesses have already played an important role in SP's programs. In fiscal year 1980, approximately 16 percent of total procurement dollars went to small/disadvantaged businesses. Our fiscal year 1981 goal is to increase this percentage to approximately 18 percent.

- As the result of a support service RFP (small business set-aside), the Maridian Corporation was awarded a $4.2 million contract. All solar energy technologies contributed funds for this procurement.

Extent of Small Business/Disadvantaged Business Participation

- In our Headquarters' planning efforts, SP identified approximately $700,000 for small/disadvantaged business participation, of which about $400,000 was authorized in the first quarter.

- Wind Energy Systems Division plans to conduct small/disadvantaged workshops in fiscal year 1981. These workshops will be held late in fiscal year 1981 and will provide small/disadvantaged businesses the opportunity to become informed about wind energy technologies and their economics.

X. Office of Transportation Programs, CS

- Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

The Office of Transportation Programs evaluates proposals which have been submitted in response to an announcement published in the Commerce Business Daily. Through this mechanism, unsolicited proposals are sought from small and disadvantaged business enterprises in the areas of: development of new, energy efficient heat engines and propulsion system components; development of alternative transportation vehicles such as electric to reduce consumption of liquid fossil fuels; development of alternative liquid fuels for use in conventional transportation vehicles; development of improved energy technology for nonhighway transportation systems; and promotion of conservation oriented practices in the purchase and operation of vehicles by both the private and public sectors.

The Office of Transporation Programs conducts many of its programs through a decentralized management system in which project management and implementation (including contracting authority) is delegated to the National Aeronautics and Space Administration (NASA) laboratories, DOE field offices, and national laboratories. These project offices have been directed to aggressively pursue and utilize small or disadvantaged businesses to the maximum extent practicable.

- Progress in Areas Identified in Previous Reports

Electric and Hybrid Vehicle Market Demonstration: At the close of fiscal year 1980, there were 94 demonstration sites across the Nation, including Hawaii. These sites were established through 65 cost-sharing contracts and agreements with the private sector, commercial fleets, Federal agencies, State and local governments, and universities for the purpose of acquiring, operating, maintaining, and collecting data on the vehicles used in the demonstration. By the end of fiscal year 1981, approximately 1,450 vehicles will be involved in the demonstration. Small business is playing a primary role in supplying these vehicles. The production capability of the electric vehicle industry to produce acceptable vehicles has grown significantly this past year.

Incentives: The Loan Guaranty Program, set forth in Public Law 94-413, is assisting the small manufacturers to expand their production capability. A loan guaranty has been awarded to a small manufacturer of electric vehicles, Electric Vehicle Associates of Cleveland, Ohio, representing a 97 percent guaranty of a $2.5 million loan. A conditional commitment to guaranty a $3.0 million loan was issued to another electric vehicle manufacturer, Jet Industries, Inc., Austin, Texas. Four additional applications totaling $9.6 million have been submitted and six project summaries totaling $11.5 million have been received.

- Extent of Small Business/Disadvantaged Business Participation

Below is a list of projects which are being performed by small or disadvantaged business contractors for the Office of Transportation Programs through direct funding in fiscal year 1981 (not through decentralized project management):

Technology Research and Analysis Corporation---------Gas Turbine Project Management Support
Mueller Associates -------------Stirling Engine Project Management Support
  Alternative Fuels Program Services
  Nonhighway Technical Support Services
Bonner and Moore----------------Impacts of Alcohol Fuels on U.S. Refining
Escher-Foster Technology--------Project Management for Hydrogen Vehicular Fuels
  Alternative Fuels Screening for Medium Speed Diesels
OAO Corporation-----------------Technical Support for the Electric and Hybrid Vehicle Program
  Commercial Support and Infrastructure Requirements for Electric Vehicle Market Demonstration
  Technical Support for Electric Vehicle Loan Guaranty Program
  Technical Support for Transportation Systems Utilization
Comsis--------------------------Auto and Light Truck Gas/Diesel In-Use Data Collection
  Analytical Support
J. D. Powers Associates---------Fuel Economy Market Research
Orkand--------------------------Driver Awareness Outreach Support
Transportation Advisors---------Voluntary Truck/Bus Trade Show Participation

- **Barriers to Small Business/Disadvantaged Business Participation**

  The largest contracts in the Office of Transportation Programs are for sophisticated hardware development, for which there are limited high technology, small/disadvantaged offerors. Wider opportunities do exist, however, for small businesses to participate in the research program as subcontractors or suppliers of automotive hardware to the major hardware development systems contractors in the preproduction prototype and/or production stage of development.

XI. Energy Information Administration

The Energy Information Administration (EIA) is composed of six major program areas. As each group has a different mission with different contract requirements, the small business component of each program area is separately described.

Energy Systems and Support (ESS)

Significant Actions to Assure Small Business/Disadvantaged Business Participation

We continue to examine our program and to identify contracts suitable for small business/disadvantaged business participation.

Progress in Areas Identified in Previous Reports

- Disadvantaged business contracts for fiscal year 1981:

  We have identified, and are in the process of obtaining, contracts for services from business firms under the 8(a) Program. The total value of these contracts is expected to be $3,187,000.

- Small business set-aside contracts for fiscal year 1981:

  We are planning to issue small business restricted solicitations and obtain support service contracts for a total of about $4,459,000, covering a period of three years.

Extent of Small Business/Disadvantaged Business Participation

- Small business awards during fiscal year 1980:

Small business contracts, including set-asides	$1,323,000
Small business subcontracts:	247,000
Total small business awards	$1,670,000

- Contract awards projected for fiscal year 1981:

Small business set-aside contracts

Total small business set-aside awards	$4,459,000

Disadvantaged business contracts

Total disadvantaged business awards	$3,187,000

Energy Information Validation (EIV)

Significant Actions to Assure Small Business/Disadvantaged Business Participation

All EIV competitive contracts have been processed as small business set-asides. EIV has processed paperwork for a $304,000 contract with a disadvantaged 8(a) firm. Additionally, Oak Ridge National Laboratory (ORNL), in support of EIV, has awarded subcontracts of approximately $1,600,000 to small and/or minority businesses.

Progress in Areas Identified in Previous Reports

EIV plans to set-aside all contracts, except those of a research nature with universities, for small or disadvantaged companies.

Extent of Small Business/Disadvantaged Business Participation

Currently, of the EIV fiscal year 1981 procurement funds of $10,355,000, a total of $3,750,000 has been awarded, or identified for award to small or disadvantaged business either directly or through the ORNL.

Barriers to Small Business/Disadvantaged Business Participation

The only barriers to additional participation by small or disadvantaged businesses are those of such companies lacking sufficient numbers of statisticians and operations research analysts to accomplish the requisite efforts.

Energy Data Operations (EDO)

Significant Actions to Assure Small Business/Disadvantaged Business Participation

It is long established EDO policy to use small business and 8(a) contractors for the majority of our data collection and processing work.

By the end of fiscal year 1981, all of EDO's data collection and processing work being done by other contractors will have been phased to small/disadvantaged prime contractors.

We currently have procurement packages being processed by the Department's Procurement Operations Office for the award of two additional contracts to 8(a) disadvantaged firms. These awards are expected to comprise approximately 16 percent of EDO's fiscal year 1981 contract budget.

Progress in Areas Identified in Previous Reports

In our last report, we indicated plans to issue a Request for Proposals (RFP) for energy data collection work to small/disadvantaged businesses and that approximately 50 percent of the solicitation would be set aside for small business and 50 percent set aside for disadvantaged business under 8(a) procedures.

Subsequently, we issued a competitive RFP for a 100 percent small business set aside with two awards intended for two one-year level of effort contracts, each having four, one-year option periods. Awards will be made within the next several months and will comprise about 20 percent of our fiscal year 1981 contract budget.

In the last half of fiscal year 1980, we awarded five contracts to small businesses—four of which were to disadvantaged 8(a) firms. These awards comprised 36 percent of EDO's fiscal year 1980 contract budget.

Applied Analysis (AA)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

AA has compiled a bidder's list of small business/disadvantaged business firms to be used as an attachment to competitive procurements. An internal policy has been established to set aside approximately 50 percent of competitive procurements to these types of firms.

Progress in Areas Identified in Previous Reports

In the last semiannual Congressional report, AA had indicated potential small business awards of $440,000. The actual award amount was $542,333 for fiscal year 1980.

Extent of Small Business/Disadvantaged Business Participation

Small business/disadvantaged business firms will soon be providing such services as producing approximately 60 publications for AA, a short-term energy forecast program, regulatory/financial statement model, and international supply side, macroeconomic model.

Energy Information Services (EIS)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

EIS is currently negotiating with a minority 8(a) consulting firm to perform services that are normally contracted out.

Progress in Areas Identified in Previous Reports

Not applicable.

Extent of Small Business/Disadvantaged Business Participation

It is anticipated that approximately 15 percent of the contract awards will be with disadvantaged or small businesses.

Barriers to Small Business/Disadvantaged Business Participation

The only potential barrier would be the lack of qualified technical sources; this does not appear to be a problem at this time.

Program Development (PD)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

PD has identified a number of 8(a) firms with which negotiations have been or are being conducted. In addition, small business set-asides have been provided for about 25 percent of PD's contracts.

Progress in Areas Identified in Previous Reports

PD awarded approximately 25 percent of its contracts to small business/disadvantaged business.

Extent of Small Business/Disadvantaged Business Participation

Approximately one-fifth of PD's contract dollars have been spent with small businesses/disadvantaged businesses.

Barriers to Small Business/Disadvantaged Business Participation

There appears to be a lack of technically qualified personnel in small/disadvantaged business firms for highly sophisticated data analysis.

XII. Office of Energy Research (ER)

Fiscal Year 1980 Notices of Program Interest (NPI)

In fiscal year 1980, two NPIs totalling $1 million were issued by ER. Over 1,300 copies of the NPIs were distributed and over 120 proposals were recieved in response. These efforts resulted in 13 awards to small business/disadvantaged business (SB/DB) firms for a total of $1,052,338, $327,866 for 8(a) firms, and $89,474 for women-owned businesses.

For fiscal year 1981, we are planning to undertake various activities to further enhance the level of participation of SB/DBs in ER programs.

Source List

We plan to establish new and better source lists of SB/DB firms which will be organized along program lines. This will be accomplished by mailing the new brochure entitled "Doing Business with the Department of Energy" which closely parallels the recently published university guide and accurately describes each program. Enclosed with the brochure will be a letter from ER soliciting expressions of interest about our programs as described in the brochure, with a reply card for firms which will enable them to express their areas of interest. Firms expressing capability in different areas will be sorted by technology/discipline and lists will be reduced to hard copy which will be made available to program managers and laboratories under our jurisdiction as well as field offices. Program managers will subsequently be able to request "capability statements" and become actively involved in the search for firms which will augment existing ER resources. We intend to engage an 8(a) contractor to help us in this function, since we estimate that approximately 5,000 firms will receive our mailing.

Laboratory Participation

We plan to help our laboratories increase their level of participation wherever possible. One approach we plan to take is to visit one laboratory on a test basis, using expertise from Headquarters organizations as well as the field offices to analyze, critique, and make constructive suggestions for new methods of outreach to the disadvantaged business community. We will recommend one technique which others in DOE are employing, i.e., developing a group of disadvantaged business firms through small contracts so that they can become competitive with the "stable" of firms with which we normally do business. We will be concentrating on high technology areas. The laboratories will, of course, be encouraged to continue their current efforts and to be innovative in developing other approaches.

XIII. Economic Regulatory Administration (ERA)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

Each ERA program office submits a contract plan for review by the Administrator at the beginning of every fiscal year. One of the primary review elements is the percentage of contract funds earmarked for small and minority-owned businesses. Wherever possible, managers are encouraged to utilize such firms; this emphasis has proven quite successful over the past number of years. ERA has received a fiscal year 1978 Minority Business Award, is scheduled to receive an award for fiscal year 1979, and is nominated for another award for fiscal year 1980. Of an available base of $54,021,551, ERA awarded $8,191,168 in prime or minority business subcontracts. We expect to match or exceed this achievement in fiscal year 1981.

Extent of Small Business/Disadvantaged Business Participation

Small and disadvantaged businesses are utilized in over 15 percent of our contractual activities. However, in that the purpose of ERA is to propose or enforce energy regulations, we do not involve any firms in policy formulation.

XIV. Office of Environment (EV)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

- Program offices have reduced support and consulting services previously obtained from large business contractors and federally funded research and development contractors by initiating contracts for these types of services to small/disadvantaged businesses.

- Initiated work order assignments under the "Quick Reaction Work Order" contract for program support from small businesses.

- Specific items and parts of most major procurement requirements have been set aside for small and disadvantaged businesses.

- All unsolicited proposals from small and disadvantaged businesses submitted to EV are reviewed in accordance with goals and objectives to increase awards to these businesses.

Progress in Areas Identified in Previous Reports

- A system of detailed information on the capabilities of numerous disadvantaged business organizations in the area of environmental program expertise has been established. Acceptable small/disadvantaged business capabilities are filed and then referenced by the program offices at the time contractor support is required.

- Comprehensive small/disadvantaged business review and monitoring procedures have become standard in EV, resulting in extensive coordination of capabilities with program requirements.

Extent of Small Business/Disadvantaged Business Participation

- Small and disadvantaged business contracts for fiscal year 1980 increased over fiscal year 1979, despite a decrease in available program funding due to inflation and other causes.
- For fiscal year 1981, it is expected that approximately $4.5 million of available contract funds will be awarded to small and disadvantaged businesses with special attention focused on increasing awards to disadvantaged businesses through 8(a) contract awards.

XV. Office of Fossil Energy (FE)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

A reserve fund of $750,000 for the exclusive use in funding small business and disadvantaged business unsolicited proposals was established for fiscal year 1981.

A Notice of Program Interest (NPI No. FE-81-SB/DB-003) was published on December 17, 1980, in the Commerce Business Daily to advise small and disadvantaged businesses of the fossil energy R&D and support contract areas of interest. As the prior year's submission by small business in the R&D areas was not particularly strong, the areas set forth in the notice were expanded to include technical support and management. This is expected to stimulate greater interest in FE programs.

In fiscal year 1980, FE published its first Notice of Program Interest (NPI), in the amount of $250,000, covering unsolicited proposals submitted by small businesses. Two awards were consummated with WSF Associates (small business) and Petroleum Training and Technical Services (disadvantaged business), representing fiscal year 1980 obligations of $175,154.

Progress in Areas Identified in Previous Reports

Since December 17, 1980, at which time an NPI was synopsized, thirteen unsolicited proposals have been received in various fields of interest. These responses include three unsolicited proposals in the technical and management support service area, indicating potential for small and disadvantaged businesses in this newly publicized area.

Many small and disadvantaged businesses have been interviewed and referred to the cognizant technical requirement groups during 1980. Some of these firms have ultimately been successful in receiving awards.

Extent of Small Business/Disadvantaged Business Participation

On-going contracts with the Assistant Secretary for Fossil Energy include: SGC Corporation (small business) $872,767, Sterling Systems, Incorporated (minority business) $1,187,140, JWK (minority business) $942,000. Small and disadvantaged businesses are becoming more involved with the FE program through support services which are being set aside for their exclusive consideration. A total of $10,261,000 for support service was placed with small business in fiscal year 1980. Greater involvement is expected as a result of a survey/study which is being made to identify high technology firms which have expertise to perform R&D contracts in fossil energy.

Barriers to Small Business/Disadvantaged Business Participation

Locating firms with fossil energy experience continues to be the overriding problem in expanding the small business and disadvantaged business participation. To help solve this problem, a contract was awarded to a small business firm, WSF Associates, to assist in locating "high technology" firms with fossil energy expertise. Another barrier is the fact that a majority of the fossil energy budget is dedicated to on-going large dollar value projects which must be funded out of each year's budget.

XVI. Office of International Affairs (IA)

Significant Actions Taken to Assure Small/Disadvantaged Business Participation

- IA continues efforts to increase small and disadvantaged business participation in our program. IA is finalizing its fiscal year 1981 procurement plan. Upon completion, we shall submit the plan to the Office of Small and Disadvantaged Business Utilization (OSDBU) for review and assistance in identifying procurements suitable for small and disadvantaged businesses.

- Several meetings with representatives from small and disadvantaged firms have been held. These firms have been referred to the IA program areas which will most likely be able to utilize their particular areas of expertise. We also periodically receive capability statements from disadvantaged firms from OSDBU and circulate them to our program officials for review.

- Due to the quick turnaround time and unique capabilities often required by IA, many of our procurement requests are noncompetitive actions. This poses a problem in establishing small business/disadvantaged business set-asides. We are, however, in accordance with procurement guidelines, making an effort to have more actions awarded competitively and will try to use small businesses/disadvantaged businesses to the maximum extent possible.

- During fiscal year 1980, IA initiated 43 procurement actions, 15 of which were awarded to small business or 35 percent of total actions. One award was made to an 8(a) firm or disadvantaged business. A list of these awards follows:

Contractor	Description
Gordon Barrows	Petroleum Technology for Nontechnical Professionals: Lecture on Oil Law and Contracts: Recent Trends
Robert F. Meagher	Petroleum Technology for Nontechnical Professionals: Lecture on Host Government Relations with Private Companies
Orkand Corporation	Data Entry for Foreign Travel Management Information System (FORTMIS)
Petroleum Economics LTD.	Analyses of Long-Range International Energy and Oil Prospects
Kramer Associates, Inc.	Energy Manpower Resources Development Program for the Sudanese Government
TIP, Inc.	Preliminary Assessment Study for Solar Policy Framework
Jensen Associates	Commonwealth Tax Code
Soros Associates	Present and Prospective United States Ports for Coal Exports
Americans for Energy Independence	Publication Proceedings for the Conference on United States/Mexican Energy Relationships
Petroconsultants	Geological and Engineering Data Purchase
Dermont Gately (NYU)	Extensions of Gately Model of OPEC Pricing Behavior
Human Resources Management *	Support for the Country Energy Assessment Program
Zender-Nerris, Inc.	Coal Demand by Electric Power Plants in Major Industrialized Countries

* Indicates disadvantaged business

Contractor	Description
Thomas J. Joyce Associates, Inc.	Modeling Studies and Their Conclusions on Energy Conservation and Its Impact on the Economy
Joe Rober Associates	Analysis on the Third Party Market for Crude Oil

XVII. Office of Nuclear Energy (NE)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

A study, commissioned by the Office of Minority Economic Impact for NE, is almost complete. This study will identify by geographic area the disadvantaged businesses which have the capability to perform work in the nuclear sector. Since the known number of disadvantaged businesses with the technical expertise to perform work on nuclear energy tasks is limited, the results of this study should have considerable positive impact on our disadvantaged business participation goals. The information developed by the study team will be provided to our program managers in Headquarters and the field for appropriate use in the procurement process.

Progress in Areas Identified in Previous Reports

Though the amount of participation in NE programs is still relatively small, our affirmative actions are starting to show some dividends. We presently have two new contracts with 8(a) minority firms and have under review the capability statements of three other 8(a) firms. These new associations will help build our foundation from which greater participation will eventually emerge.

Extent of Small Business/Disadvantaged Business Participation

- NE recently consummated a contract with Clemco, Inc., an 8(a) minority business firm, to provide administrative and technical evaluation services to our Columbus, Ohio, waste management terminal storage office. This contract encompasses two years and is valued at $500,000.

- NE has modified an existing contract with AMAF Industries, an 8(a) minority business firm. The modification provides AMAF with approximately $900,000 additional funding over two years. The scope of the modification requires AMAF to coordinate and manage seven R&D efforts conducted at several minority academic institutions.

- NE has also approved a contract with Automated Business Services (ABS), another 8(a) minority business firm, to provide operational support and system development for our Headquarters business management information system. The one-year contract is for $200,000. Currently, we have entered into discussions with ABS to modify the term and resources of the contract.

XVIII. Office of Minority Economic Impact (OMEI)

Background

OMEI was established in fiscal year 1979 pursuant to Section 641 (Title VI, Part 3) of the National Energy Conservation Policy Act (Public Law 95-619, dated November 9, 1978). The office, organized in October 7, 1979, is headed by a Director who reports to the Office of the Secretary and is under the general supervision of the Deputy Secretary.

Mission

The mission of OMEI is to advise the Secretary on the effects of national energy policies, programs, regulations, and other DOE actions on minorities and to recommend policies to assist minorities and minority business affected by the Department's programs and opportunities.

In carrying out these responsibilities, the office formulates and manages programs to provide management, technical and financial assistance to minority businesses, educational institutions, and development organizations to enable them to obtain or participate in the Department's research, demonstration, grant, contract, or other program opportunities. The office coordinates closely with the key program resource offices within the Department to facilitate minority access to those in-house programs and assistance. A research program is also conducted by the office with the assistance of the Energy Information Administration and other public and private research and data collection offices or centers. Such research is focused on determining the effects of national energy programs and departmental actions on minorities. The Director of the office has the additional responsibility to provide outreach to and liaison with minority businesses, educational institutions, and communities to provide them with information on the Department's programs, energy policies, and research or data collection results.

Functions

Conducts an on-going research program to determine the effect of national energy programs, policies, and regulations of the Department on minorities.

Develops and recommends to the Secretary policies to assist, where appropriate, minorities and minority business enterprises in dealing with such effects.

Provides management and technical assistance to minority educational institutions and minority business enterprises to enable these enterprises and institutions to participate in the research, development, demonstration, and contract activities of the Department.

Provides, as appropriate, financial assistance in the form of loans to minority business enterprises as a means of fostering participation in contract activities of the Department.

Coordinates with other DOE organizations including Policy and Evaluation, Intergovernmental, Institutional Relations, Equal Opportunity, Procurement, and General Counsel to assure that appropriate departmental resources are brought to bear on assigned activities.

Progress in Areas Identified in Previous Reports

Identified DOE program assistance and business opportunities available to minorities by conducting a review of existing DOE programs and resources, and of pending or new energy legislation. The following programs were emphasized:

- Synthetic Fuels Corporation/Alternative Fuels

  OMEI and OSDBU jointly developed language used in the alternative fuels assistance grants that provided additional evaluation/policy points for proposals that included small or minority business participation. These points add to a proposal's overall rating and can improve the chances for grant award.

- Schools and Hospitals Program

  The North Carolina Program was selected as a case study to evaluate effectiveness of program implementation at the local level. Recommended to Deputy Director that States should be permitted to transfer unused hospital funds to the schools program as suggested by North Carolina officials. On December 29, the program issued a Notice of Proposed Rulemaking that would authorize this funding transfer. This action will increase funding for all school participants.

- Residential Conservation Service (RCS)

  Recommended actions to make small and minority firms aware of business opportunities with RCS. Requested the Program Director to build in safeguards to protect small businesses from possible anticompetitive impacts of new legislative provisions that now permit public utilities to directly finance and subcontract for installation of energy improvements in residences (P.L. 96-294, Section 546).

- Developed the initial plans and draft regulations for the OMEI direct loan program. OMEI is now in the process of reviewing comments received on the proposed regulations and in developing appropriate documentation and financial controls. OMEI is developing a contract tracking and monitoring system to address problems OMEI contractors have in dealing with DOE. Provided management and technical assistance to minority businesses by linking them with other DOE programs that provide direct assistance. Monitored the progress of minority proposals within DOE to assure they receive a thorough evaluation.

- Advised the Secretary on the socio-economic and environmental effects of national energy policies, programs, and the Department's regulations and actions on minorities.

  OMEI provided the DOE comments on the proposed rules for equal opportunity regulations as applied to the Alaska Natural Gas Transportation System Project (ANGTS). OMEI is currently engaged in negotiations with the Office of the Federal Inspector (ANGTS) to determine how the day-to-day implementation of the regulations will be accomplished.

- Recommended to the Secretary policies and changes in departmental actions or programs to assist minorities and minority businesses affected by DOE actions, or to gain greater access to opportunities and assistance available from the Department.

- Evaluated key DOE programs and operations to determine their effectiveness in meeting needs of minorities (e.g., weatherization, schools and hospitals conservation grants, alternative fuels, and residential conservation service).

- Maintained liaison with and outreach to minority businesses, individuals, communities, and educational institutions to provide energy information and assistance, and to assure that DOE plans, policies, and actions address their needs, program objectives and problems. Utilized the outreach and service capabilities of the DOE regional and operations offices to assist OMEI in this task.

- OMEI and the Office of Small and Disadvantaged Business Utilization (OSDBU) enlisted the on-site assistance of regional and operations offices to increase contracting opportunities for small and minority businesses in DOE field facilities. An important factor in exceeding the Department's disadvantaged business procurement goal of four percent was the effort by the Small and Disadvantaged Business Specialists located at these field facilities across the Nation. In dollar terms, the four percent translated into $280.5 million for fiscal year 1980 of which $103.7 million were in 8(a) awards.

- OMEI and OSDBU jointly reviewed and evaluated the minority business procurement programs at the Oak Ridge Operations Office and Chicago Operations and Regional Office. These two joint on-site visits resulted in remedial action and useful Headquarters/field staff information exchanges. The OSDBU Director visited all other major DOE field facilities which completed the on-site reviews noted in the previous report.

- OMEI obtained approval for its Minority Advisory Council from OMB and GSA. Notification was published in the Federal Register of December 22, 1980. Members will be nominated for approval by the incoming Secretary of Energy.

- Conducting research to identify existing and potential employment opportunities for minorities in energy-related fields and industries. Also, identifying education and training needs and availability to improve match between those jobs and qualified minorities.

- Working with minority universities, and universities with large minority populations, to conduct OMEI research projects, encourage development of an energy-related curriculum, and to provide energy information and access to DOE programs and resources. Awarded socio-economic research grants totaling $320,000 to five historically black universities to assess current energy needs of minorities and low income groups. The institutions are Atlanta University, Jackson State University, Kentucky State University, Prairie View A&M University, and Virginia Union University.

- OMEI initiated and coordinated DOE efforts that resulted in depositing $15.8 million received under consent orders and agreements with various oil companies in 79 participating minority banks. Each bank received $200,000 which will bear interest back to DOE at the prevailing Treasury Bill rate at time of deposit. This is the largest single deposit made by a Federal agency with the minority financial community.

- Based on OMEI's request to the DOE/Director of Energy Research (ER), the annual Institutional Plans submitted by each multi-program laboratory and the Solar Energy Research Institute (SERI) will now contain the following information:

  --Current fiscal year contracting activity with minority firms by the 13 institutions in terms of dollars and percentage of procurement.

  --Projected goals for the next five years covered by each Institutional Plan.

- OMEI is conducting a joint program with the Department of Commerce's Minority Business Development Agency (MBDA) to assist minority businesses in the commercial application of energy-related technologies. The Technology Commercialization Program is funded by OMEI. Initial screening of the proposals is performed by MBDA's eight Technology Commercialization Centers.

- OMEI was assigned to direct and coordinate the DOE Historically Black College Program (HBC) established in Federal agencies by Executive Order 12232. The purpose of the program is to increase participation in DOE programs by HBCs. OMEI met with major program offices and has developed a preliminary plan. Approval of a specific program and funding detail is awaiting approval by the incoming Secretary of Energy.

Disadvantaged Business Awards Since Previous Report

OMEI made 13 contract and grant awards to small and disadvantaged businesses and to minority educational institutions for research. The majority of these awards were for 8(a) disadvantaged contracts totaling nearly $1 million. The awards were for research and information analysis in the following areas affecting the overall minority community and minority business enterprises:

- Direct effects of gasoline price increases and gasoline rationing plans on minority Americans and minority business enterprises.
- Production of gasohol feedstocks and product by minority farmers and small businesses.
- Participation in the DOE/Synthetic Fuels Corporation programs to increase national production of synfuels.
- Review of DOE programs/technologies to identify high technology business opportunities and qualified minority firms with similar interests in the following areas:

  --Conservation other than gasohol
  --Solar
  --Nuclear
  --Defense

- Identification of energy-related job opportunities, skill requirements, training programs, and placement sources (special emphasis toward minority youth in the 16-24 age group).

Secretary's Conservation Objectives Project, Calendar Year 1980--8(a) Award

OMEI was assigned the responsibility to provide low-income and Spanish language material on residential energy retrofitting activities. With the assistance of the Office of Conservation and Solar Applications, OMEI arranged for publication and distribution of 100,000 copies of the residential conservation pamphlet entitled "Low Cost/No Cost" (Spanish translation). The contract for this project was awarded to an 8(a) firm.

XIX. Office of Resource Applications (RA)

Significant Actions Taken to Assure Small Business/Disadvantaged Business Participation

- RA places continuous emphasis on its contracting efforts to assure that small/disadvantaged business receives maximum consideration for awards.

  --Personnel receive formal training in all aspects of small business contracting to assure a better understanding of the applicable laws, policies, and procedures to improve the implementation of our program. In addition, they are encouraged to participate in small/disadvantaged business conferences and symposiums.

--There are constant outreach efforts to identify firms with capabilities to perform work in our programs. This has expanded from a base of well qualified professional organizations.

--All procurement actions are carefully reviewed for possible participation or set aside by small/disadvantaged businesses.

Progress in Areas Identified in Previous Reports

In our last report, it was noted that the Power Marketing Administrations were having difficulty locating SB/DB firms with a high level of technical competence in the specialized area of power transmission. In October, Bonneville Power Administration awarded a $972,000 contract to Capital Construction Co., a minority-owned small business. This contract is for the construction of transmission lines on the Hanford Reservation near Richland, Washington.

Extent of Small Business/Disadvantaged Business Participation

Resource applications exceeded its goals set for contracting with small/disadvantaged businesses in fiscal year 1980. Highlights are:

- The largest contract to a minority-owned business by DOE has been awarded to the Thacker Construction Company, inc., of Alton, Illinois, for construction services to support the Nationçs Strategic Petroleum Reserve. This cost plus award fee contract is for a period of one year with options to extend it for an additional three years. The estimated cost for the first year of the contract is approximately $23 million. The construction services to be provided by Thacker will be in support of the Reserveçs modification, equipment upgrading, and enhancement program and will be performed at the Reserve sites in Louisiana and Texas.

- High Life Helicopters, Inc., a minority/small business firm of Puyallup, Washington, has signed a new contract to conduct aerial radiometric and magnetic surveys for DOEçs National Uranium Resources Evaluation (NURE) program in seven States. This $494,970 contract, signed at the Departmentçs Grand Junction (Colorado) Office, brings to more than $7 million the value of contracts signed by High Life and DOE. Since 1977, High Life helicopters have surveyed 88 specific areas and have flown a total of 202,280 miles on survey assignments for the Department. DOE contracts were instrumental in getting High Life started and assisting their growth by encouraging their participation in uranium survey work.

  The High Life firm was organized in 1969 by Earl G. Reubel, a Viet Nam veteran and an ex-Army helicopter pilot, and three other Viet Nam veterans. Reubel still heads the company. The organization has grown from one helicopter to a fleet of 14. It operates from the Gulf of Mexico to Alaska and as far east as New York State. High Life got its first helicopter in February 1979 when the company specialized in health care roles. It first began flying for the NURE program in March 1977.

- In July, DOE awarded $200 million in feasibility study grants and cooperative agreements in the alternate fuels program. Of the 114 firms selected, 21 included small/disadvantaged businesses as either primes or subcontractors. A second round of awards amounting to $270 million was announced in December. In this selection, there were 53 projects involving small/disadvantaged businesses out of a total of 79.

XX. Nonnuclear Research, Development and Demonstration Funding with Nonprofits

DOE Nonnuclear RD&D Funding with Nonprofits

As summarized in the chart below, educational institutions are major performers of energy research and development in nonnuclear fields for DOE.

Individual university scientists are continually encouraged to submit unsolicited research proposals to DOE for consideration and review. In addition, university proposals can be supported on a competitive basis following the receipt and review of a proposal in response to a Request for Proposals (RFP), a Program Research and Development Announcement (PRDA), or similar solicitations. University scientists are also encouraged to develop and submit joint research proposals with industrial groups, including small businesses on research areas of mutual interest and concern.

STATISTICAL SUMMARY OF DEPARTMENT OF ENERGY NONPROFIT,
NONNUCLEAR RESEARCH, DEVELOPMENT, AND DEMONSTRATION (RD&D)
FUNDING FOR FISCAL YEAR 1980 WITH NONPROFITS

	Whole Dollars
Educational, Nonprofit, and Not-for-Profit Institutions	$157,245,836
Educational, State, and Local Government	59,874,504
Hospital, Nonprofit, and Not-for-Profit Institutions	150,124
Other Nonprofit and Not-for-Profit Institutions	95,131,075
Other, State and Local Government	234,030,731
Total	$546,432,270

Enclosure 2

SEP 21 1981

Mr. James L. Blum
Assistant Director for Budget Analysis
Congressional Budget Office
U. S. Congress
Washington, D. C. 20515

Dear Mr. Blum:

The following information is respectfully submitted in accordance with your letter of August 19, 1981, addressed to Mr. Hilary Rauch, Director, Procurement and Assistance Management, requesting a preliminary cost estimate related to our Department's participation in S. 881.

I would like to emphasize that the Department agreed with the concept of S. 881, but took exception to several aspects of the proposed legislation. Our agency will implement whatever legislation is signed into law, but will need some additional resources as you have implied.

I am sure that you can appreciate our problem in attempting to arrive at costs for implementing a program which is nebulous at this time. However, we have attempted to make some estimates based on assumptions which we hope are logical. For this exercise we have used the proposed percentages as delineated in S. 881.

The mechanism for administering the SBIR program outlined in S. 881 is in an embryonic stage at this time. Procurement and contractual personnel could advertise the requirements and issue the contractual documents; technical staff in our prog areas, both at Headquarters and in the field organizations, would perform some of the technical monitoring, evaluation of proposals and development of R&D projects. It would require that a specific percentage of our effort be reserved for this program.

In arriving at the rationale and cost estimates listed below, we based our conclusions on input from the National Science Foundation which has conducted a very similar, but smaller, program for several years. We also consulted with the Department of Defense, which has developed a similar program on a much larger scale than is contemplated at the Department of Energy.

The following is our estimate of administrative costs for establishing and implementing the SBIR program, including data systems and reporting requirements, which will be absorbed into our existing Integrated Procurement Management Information System data base. Obviously, since additional expense over existing operations is contemplated, no savings are expected or indicated.

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ESTIMATED COSTS FOR POSSIBLE IMPLEMENTATION OF S. 881

Fiscal Year	Estimated SBIR Awards	Additional Personnel*	Travel, Training and Publications	Total
1982	$12,000,000	$195,000	$60,000	$255,000
1983	36,000,000	$255,000	$70,000	$325,000
1984	58,000,000	$333,000	$90,000	$423,000

*Includes 30 percent overhead

If you need any clarification or additional information, please contact Mr. Jack Koser, Director, Small Business Division, at 252-8210.

Sincerely,
Original signed by
John W. Shepard

John W. Shepard, Director
Office of Small and Disadvantaged
Business Utilization

PR-12:MTobin:JKoser:me:252-8203:9/18/81
PR-2:BRoth:me:retyped:9/21/81

CONCURRENCES
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Enclosure 3

STATEMENT OF N. DOUGLAS PEWITT
ACTING DIRECTOR, OFFICE OF ENERGY RESEARCH
DEPARTMENT OF ENERGY
BEFORE
THE INNOVATION AND TECHNOLOGY SUBCOMMITTEE
OF THE
SENATE SMALL BUSINESS COMMITTEE

July 15, 1981

Mr. Chairman, it is an honor to appear today to discuss S. 881, the "Small Business Innovation Research Act of 1981." I am accompanied by Hilary Rauch, Director, Procurement and Assistance Management Directorate and John Shepard, Director, Office of Small and Disadvantaged Business Utilization.

As you are well aware, S. 881 is aimed at strengthening the role of small, innovative firms in Federally funded research and development. More specifically, the purposes of the Bill are "(1) to stimulate technological innovation; (2) to use small business to meet Federal research and development needs; and (3) to increase private sector commercialization of innovations derived from Federal research and development." These goals are laudable ones; and the Department firmly supports the intent of the Bill. We know from experience that research is essential to technology development; and it is the United States' success in the development and marketing of technology that, in part, has made our standard of living possible. Small businesses have played and will continue to play an important role in this effort. Before I address the specifics of S. 881, let me comment briefly on the R&D environment which the Bill would impact.

Various sectors of the economy make their most significant contributions to this technology development effort at different points on a spectrum which ranges from the most basic scientific research through development, demonstration and commercialization. At the basic research end of the scale, the Federal government supports projects at universities, laboratories and non-profit organizations because the private sector alone cannot reasonably be expected to undertake this research which is long-term and often high-risk. In addition there is no guarantee of benefits to the private sector due to the generic and unpatentable nature of the research. At the other end of the spectrum--in the development and marketing of products and services for profit--it is the private sector, small and large business alike, that excels.

Indeed, this distinction is reflected in the Administration's policy on the role of the Federal government in the energy field. Briefly stated, the government will focus its support on long-term, high-risk research and development that industry cannot be expected to undertake. Industry will be expected to support demonstration of promising near-term technologies and to be responsible for their ultimate commercial deployment. It will be the marketplace, not government, which will supply the enormous capital investments required to support the commercial introduction of new energy technologies into the economy.

Thus, DOE's focus is on the long-range, high-risk end of the spectrum where the private sector, small business included, has more limited opportunities than in commercialization. Even though opportunities are more limited in basic research, let me stress our firm support of small business participation in Federal programs wherever those capabilities can best be used. As the Committee is aware, the Department, in conjunction with the Small Business

Administration, establishes small business goals for contracts of more than $10,000. Departmental achievement against SBA goals is measured by dollars received by small businesses from all sources, prime and subcontract. We have aggressively pursued, met and, in many cases, exceeded our small business goals. Every year since the Department was established, our overall small business goal has been increased and we have exceeded it. This year, our overall goal was increased again from $1.491 billion in FY 1980 to $1.617 billion in FY 1981 and we hope to exceed it. If we meet our FY 1981 goal, it will represent 20.5% of the total value of procurement--a significant commitment to the involvement of small business in the Department's programs.

The Department's support for small business is evidenced not only in its performance with regard to goals but in on-going activities. In fact, the Energy-Related Inventions Program sponsored by the Department is one of several DOE activities considered to be an SBIR-equivalent program. It is conducted in three stages leading to commercialization. The Inventions Program provides for technical screening (first stage) and in depth analysis (second stage) of inventions by the Office of Euergy-Related Inventions in the National Bureau of Standards (NBS), Department of Commerce; and follow-on support by the DOE of inventions identified by NBS as promising. This program gives particular attention to small businessmen and individual inventors, and provides one-time assistance, usually in the form of grants to assist the NBS-recommended inventors in developing or commercializing their inventions. In an attachment to my testimony I have provided additional information on some of the Department's initiatives aimed at encouraging small business involvement in our programs.

Now let me turn to S. 881 and discuss ~~on~~ its impact on R&D within the Department of Energy. My comments may shed some light on the difficulty of legislating the details of a~~n~~ Small Business Innovation Research (SBIR) program for R&D agencies whose missions and R&D needs vary widely across the Federal government. While the Department would be interested in participating in some form of pilot SBIR program which would allow the designated agencies flexibility to plan a program in accord with an agency's mission needs, we have serious problems with several sections of the Bill as written. My comments are intended to highlight the problem areas and provide constructive suggestions that may be helpful in revising the Bill.

The problem of flexibility vis-a-vis agency missions is particularly evident in Section 4(f) of the Bill. This section sets forth a schedule for SBIR expenditures for agencies whose R&D budgets exceed $100 million. That schedule assigns to the SBIR program not less than two-tenths of one percent of the R&D budget in FY 1982, not less than six-tenths of one percent in FY 1983 and at least one percent in FY 1984 and subsequent years. We strongly oppose these fixed percentage set-asides as means to increase the small business share of the Federal R&D dollar. Rather than make efficient use of small business capabilities, such set-asides would be inefficient use of the Federal dollar. A fixed set-aside would not take account of differing agency missions; nor would a fixed set-aside recognize the extent to which R&D funds are already committed to programs which, by their nature, do not offer significant opportunities for small business participation. Let me be more specific. As you are aware, the Department of Energy has a large R&D budget ($5.8 billion in FY 1981), a significant portion of which is dedicated to nuclear weapons R&D. For example, in FY 1981, the budget includes $1.6 billion for defense-related R&D. The required size of research facilities and the cost of equipment to support them tend to limit significant small business participation in this R&D. Similarly, the Department anticipates spending about $834 million in FY 1981 in the Fossil Energy program. At a prime contract level these projects offer few opportunities for small business participation. The same is true of the large, expensive accelerator, laboratory and research facilities funded under the High Energy and Nuclear Physics and Magnetic Fusion programs under my cognizance. It is also worth noting that total DOE R&D dollars will decline between FY 1981 and FY 1982, particularly in the Fossil, Conservation and Renewable Energy programs. Thus, the opportunities for small business decline even further.

A similar flexibility problem exists in Section 4(e) which calls for a three phase SBIR. The first phase would address the technical and economic feasibility of ideas proposed; the second phase would consider the potential commercial applications of the research or R&D proposed; and the third phase would call for private capital to pursue commercial applications with some follow on Federal contracts. These phases are not necessarily applicable to all R&D agencies and could be deleted from the Bill without inhibiting an agency's ability to achieve the Bill's objectives.

Section 4(h) imposes research and development goals for Federal agencies including the Department of Energy whose research and development budgets exceed $20 million. The same practical effect is presently provided by Section 15(g) of the Small Business Act which requires the head of each

Federal agency, in consultation with SBA, to estab lish goals for the participation of small business in all procurement contracts having a value of over $10,000. Rather than add to the proliferation of goals categories already subject to interagency negotiation with the Small Business Administration under Section 15(g) of the Small Business Act, we strongly urge that research and development small business considerations be treated as another component inherent in current small business goaling procedures.

Section 3(5) requires coordination in the release of the Small Business Innovation Research solicitations with the Small Business Administration. Such coordination would directly involve another agency in our acquisition process. Scheduling agencywide procurements involved in the Small Business Innovation Research through a clearinghouse at the Small Business Administration would pose an unnecessary administrative burden and delay issuance of solicitations. We could, nonetheless, keep the SBA informed of the timing of solicitation releases and insure that the solicitations receive broad visibility through synopsis in the Commerce Business Daily and other appropriate trade journals and scientific publications.

Another comment related to SBA responsibilities concerns Section 3 which amends Section 9(b) of the Small Business Act. A new item 9(b)(6) would mandate SBA to "independently survey and monitor the operation of SBIR programs within participating agencies." We believe that this oversight of R&D agency acquisition processes by a non-technical agency such as SBA is inappropriate and duplicates existing oversight authority vested in the Executive and legislative branches.

The requirement of (J)(1)(A) to provide for standardized SBIR solicitations, proposals and evaluation processes could deter use of already existing innovative types of solicitations well adapted to small business participation, such as the Department's Program Research and Development Announcement and Program Opportunity Notices. We would recommend that each agency be allowed flexibility to use the solicitation instruments best suited to its mission and needs.

Section 4(e)(4) of S. 881 proposes a definition of R&D that is different from the several existing definitions already in use. For Federal reporting purposes, the Department is directed to use a 7-stage definition for obligations collected by the Federal Procurement Data System. The Federal Procurement Data System definition is not identical to that employed in the Office of Management and Budget Report Number 44 which details research and development budget authority. Since the objectives of the Bill can be carried out in the absence of a statutory R&D definition, we would recommend that the definition be deleted rather than add yet another definition to the system.

As I indicated earlier, my comments have focused on revisions to the proposed Bill that would result in a flexible SBIR pilot program which could be shaped to meet each agency's needs. This flexibility would allow the most efficient use of Federal resources and the most effective use of small business capabilities.

That concludes my testimony. I will be happy to respond to questions.

ATTACHMENT

Small Business Initiatives & Activities

Initiatives

1. Unsolicited Proposal Reserves

One method for reaching out into the small business R&D community is through a DOE innovation called the Unsolicited Proposal Reserves. In addition to our regular unsolicited proposal procedure, we initiated in FY 1979 a new program under which Federal reserves are set-aside exclusively to support meritorious unsolicited proposals submitted by small businesses. Three program offices have signed agreements with the Procurement and Assistance Management Directorate in which administrative procedures were prescribed, including the Office of Energy Research and the Offices of Conservation and Renewable Energy and Fossil Energy.

Acceptance of unsolicited proposals is governed by DOE and Federal Procurement Regulation (FPRs) [DOE PR 1-4.909(d)], including the following criteria:

Unique, meritorious, methods, approches, or ideas which have originated with or are assembled together by the offeror;

Overall scientific, technical, socio-economic merits;

Potential contributions to DOE mission; and

Related experience and qualifications of key personnel.

2. Procurement automated Source System (PASS)

PASS is an automated data bank of small, disadvantaged, and women-owned businesses (SB/DB/WOB) accessed through remote terminals located at various Government and commercial locations throughout the United States. This system, jointly funded by the DOE and the SBA, has consistently grown since its inception in 1977. At present, PASS contains 40,889 SB/DB/WOB firms whose capabilities can be displayed at 65 terminals. The DOE has installed a total of 21 terminals at operations offices, the Strategic Petroleum Reserve and GOCO facilities. The DOE has the largest quantity of remote terminals in the Federal Government.

3. Procurement Preference Reviews of R&D and Other Procurement Requests

The Headquarters' Office of Small and Disadvantaged Business Utilization (OSDBU) conducts preference reviews or "screening" of individual procurement requests accompanied by "415" review forms originating from DOE Headquarters organizations. Based on their analyses, OSDBU Small Business Specialists recommend small business/labor surplus area set-asides or refer for 8(a) consideration. In fiscal year 1980, OSDBU-designated staff members analyzed 983 work statements contained in procurement requests valued at $1.4 billion in order to match requirements to capabilities of small businesses, disadvantaged businesses, and labor surplus area (SB/DB/LSA) concerns. This matching process is accomplished through consultation with programmatic outlay offices, retrieval from DOE's PASS terminal, active source files, and recent procurement history. Field SB/DB Specialists conduct screening of procurement requests originating at field locations.

Due in large part to our transactional screening procedure, 8(a) awards rose from $32.4 million in fiscal year 1979 to $103.7 million in fiscal year 1980. During the same period, small business set-asides grew from $309.7 million to $418.6 million. LSA set-asides reached $74.3 million in fiscal year 1980, $30 million higher than in the previous fiscal year.

4. Recent Small/Disadvantaged Business Program Initiatives

- o Assigned small and disadvantaged business goals to program as well as procurement offices;
- o Established Secretarial small/disadvantaged small business awards program;
- o Established a DOE-wide network of SB/DB Specialists and Technical Advisors at Headquarters, field installations and GOCO plants and laboratories;
- o Designated products and services purchased at DOE and contractor operated sites as class set-asides;
- o Signed agreement with SBA to raise construction class set-aside threshold to $3 million; and
- o Modifying PASS keyword thesaurus to incorporate technical coverage by technology discipline. Solar and fossil expanded coverage have been transmitted to SBA for inclusion in their PASS central data base.

Solicitation Instruments

o Program Research and Development Announcements (PRDA)

This solicitation vehicle was developed to encourage submission of innovative ideas from individuals and private concerns, including small businesses and public entities. PRDA's are used to provide potential proposers with information concerning DOE's interest in entering into arrangement for research, development, and related projects in specified areas of interest.

Announcements for PRDA's are published in the CBD, and multiple awards usually result from each PRDA solicitation. If after review of a PRDA's requirements, it appears that the R&D effort described in it is especially suited to small businesses, one or more of the awards resulting from the PRDA are set-aside exclusively for small, technology-based firms.

DOE uses the PRDA only where R&D is required within broadly defined areas of interest to support program goals, but it is difficult, if not impossible, to describe in any reasonable degree of detail the nature of the work contemplated because of:

- o the multiplicity of possible approaches, within the current state of the art, available for solving the problems;
- o the desirability of involving a broad spectrum of organizations in seeking out solutions to the problems posed;
- o The expectation that many individual proposers will have unique qualifications or specified capabilities which will enable them to perform portions of the research or development program (without necessarily possessing the qualifications to perform the entire program) so that the overall support may be broken into segments which cannot be ascertained in advance; and
- o the desirability of fostering new and creative solutions.

o Program Opportunity Notices for Commercial Demonstrations

This is another unique solicitation technique in which:

(a) DOE encourages the submission of proposals to accelerate the demonstration of the technical, operational, economic, and commercial feasibility and environmental acceptability of particular energy technologies, systems, subsystems, and components. Program opportunity notices are used to provide information concerning scientific and technological areas encompassed by DOE's program. DOE issues, from time to time, program opportunity notices for proposals for demonstration of various forms of nonnuclear energy and technology utilization.

(b) Synopses of the notices are published in the CBD, In addition, the notices are circulated directly to potentially interested individuals, private and public entities (excluding Federal agencies) and associations. They are especially directed to small business concerns and socially and economically disadvantaged concerns to insure that they are given every opportunity to participate in such procurements.

"(9) Nothing contained in this subsection shall be construed to supersede the requirements of Defense Manpower Policy Number 4A (32A CFR Chap. 1) or any successor policy.

"(10) In the case of contracts within the provisions of paragraphs (4), (5), and (6), the Administration is authorized to—

"(A) assist Federal agencies and businesses in complying with their responsibilities under the provisions of this subsection, including the formulation of subcontracting plans pursuant to paragraph (4);

Review.

"(B) review any solicitation for any contract to be let pursuant to paragraphs (4) and (5) to determine the maximum practicable opportunity for small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals to participate as subcontractors in the performance of any contract resulting from any solicitation, and to submit its findings, which shall be advisory in nature, to the appropriate Federal agency; and

Subcontracting plans, compliance evaluation.

"(C) evaluate compliance with subcontracting plans, either on a contract-by-contract basis, or in the case contractors having multiple contracts, on an aggregate basis.

Report to congressional committees.

"(11) At the conclusion of each fiscal year, the Administration shall submit to the Senate Select Committee on Small Business and the Committee on Small Business of the House of Representatives a report on subcontracting plans found acceptable by any Federal agency which the Administration determines do not contain maximum practicable opportunities for small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals to participate in the performance of contracts described in this subsection.".

CHAPTER 3

15 USC 644.

SEC. 221. Section 15 of the Small Business Act is amended by adding at the end of subsection (f) the following new subsections:

"(g) The head of each Federal agency shall, after consultation with the Administration, establish goals for the participation by small business concerns, and by small business concerns owned and controlled by socially and economically disadvantaged individuals, in procurement contracts of such agency having values of $10,000 or more. Goals established under this subsection shall be jointly established by the Administration and the head of each Federal agency and shall realistically reflect the potential of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals to perform such contracts and to perform subcontracts under such contracts. Whenever the Administration and the head of any Federal agency fail to agree on established goals, the disagreement shall be submitted to the Administrator of the Office of Federal Procurement Policy for final determination.

Reports to Small Business Administration.

"(h) At the conclusion of each fiscal year, the head of each Federal agency shall report to the Administration on the extent of participation by small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals in procurement contracts of such agency. Such reports shall contain appropriate justifications for failure to meet the goals established under subsection (g) of this section. The Administration shall submit to the Select Committee on Small Business of the Senate and

Submittal of information to congressional committees.

the Committee on Small Business of the House of Representatives information obtained from such reports, together with appropriate comments.

"(i) Nothing in this Act or any other provision of law precludes exclusive small business set-asides for procurements of architectural and engineering services, research, development, test and evaluation, and each Federal agency is authorized to develop such set-asides to further the interests of small business in those areas.

Small purchase procedures.

"(j) Each contract for the procurement of goods and services which has an anticipated value of less than $10,000 and which is subject to small purchase procedures shall be reserved exclusively for small business concerns unless the contracting officer is unable to obtain offers from two or more small business concerns that are competitive with market prices and in terms of quality and delivery of the goods or services being purchased. In utilizing small purchase procedures, contracting officers shall, wherever circumstances permit, choose a method of payment which minimizes paperwork and facilitates prompt payment to contractors.

Office of Small and Disadvantaged Business Utilization, establishment.

"(k) There is hereby established in each Federal agency having procurement powers an office to be known as the 'Office of Small and Disadvantaged Business Utilization'. The management of each such office shall be vested in an officer or employee of such agency who shall—

"(1) be known as the 'Director of Small and Disadvantaged Business Utilization' for such agency,

"(2) be appointed by the head of such agency,

"(3) be responsible only to, and report directly to, the head of such agency or to his deputy,

"(4) be responsible for the implementation and execution of the functions and duties under sections 8 and 15 of this Act which relate to such agency, 15 USC 637, 644.

"(5) have supervisory authority over personnel of such agency to the extent that the functions and duties of such personnel relate to functions and duties under sections 8 and 15 of this Act,

"(6) assign a small business technical adviser to each office to which the Administration has assigned a procurement center representative—

"(A) who shall be a full-time employee of the procuring activity and shall be well qualified, technically trained and familiar with the supplies or services purchased at the activity, and

"(B) whose principal duty shall be to assist the Administration procurement center representative in his duties and functions relating to sections 8 and 15 of this Act, and

"(7) cooperate, and consult on a regular basis, with the Administration with respect to carrying out the functions and duties described in paragraph (4) of this subsection.

"This subsection shall not apply to the Administration.".

Uniform Federal procurement regulations and procedures.
41 USC 405a.
41 USC 401 note.

SEC. 222. The Administrator of the Office of Federal Procurement Policy is authorized and directed, pursuant to the authority conferred by Public Law 93-400 and subject to the procedures set forth in such Public Law, to promulgate a single, simplified, uniform Federal procurement regulation and to establish procedures for insuring compliance with such provisions by all Federal agencies. In formulating such regulations and procedures the Administrator of the Office of Federal Procurement Policy shall, in consultation with the Small Business Administration, conduct analyses of the impact on small business concerns resulting from revised procurement regulations, and

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

RECEIVED
FEB - 1982
COMMITTEE ON SCIENCE
AND TECHNOLOGY

The Honorable Don Fuqua
Chairman
Committee on Science and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your request for our views on H.R. 4326, the "Small Business Innovation Development Act." You requested that in our report we distinguish between H.R. 4326 and the Senate counterpart, S. 881, as passed by the Senate. Both of these bills are designed "to amend the Small Business Act to strengthen the role of small innovative firms in federally funded research and development, and to utilize Federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the Nation's economy."

In summary, the Department of Health and Human Services recognizes the important role in innovation played by small businesses and strongly supports the basic concept of a Small Business Innovation Research (SBIR) Program. However, we cannot support H.R. 4326 as drafted because of the level of the set-aside it would mandate for the SBIR Program. At the same time, we wholeheartedly support passage of S. 881, which includes an acceptable set-aside level for the SBIR Program.

H.R. 4326 would require that each Federal agency with a research and development budget over $100 million set aside for a SBIR Program not less than one half of one percent of its R&D budget for FY 1982, not less than one percent for FY 1983, not less than two percent for FY 1984, and not less than three percent for all subsequent fiscal years. These awards would be made through a standardized, three-phase process. Grant and contract awards already being received by small businesses through any means other than that established by the bill are specifically excluded from counting toward the SBIR set-aside percentage requirement. To implement the SBIR Program, agencies would be required to issue solicitations following a schedule determined cooperatively with the Small Business Administration (SBA); follow policy directives for the conduct of these programs established by the SBA; establish goals for funding agreements; and report annually to the SBA on the number of awards over $10,000.

In testimony on the "Small Business Innovation Research Act" before the House and Senate Small Business Committees, we expressed concern that our experience in attempting to identify small businesses through our "sources sought" announcements and conferences indicates a relative paucity of small businesses which possess biomedical research capabilities, especially in the basic science areas. We believe, however, that we can meet the one percent set-aside requirement contained in the Senate bill. With respect to the higher set-aside level in H.R. 4326, we believe that it is unrealistic to assume that hundreds of new firms in the area of biomedical research would undertake to apply for the relatively small awards typical in SBIR type programs. We base this expectation on the fact that the existing private sector health research effort is for the most part concentrated in larger firms, and that the nature of this research may require, as it does in the area of drug development, an investment in the millions of dollars and highly specialized research staff and facilities.

In addition to our concern about the magnitude of the set-aside in the House bill, we also wish to suggest several amendments to the legislation. We believe the House bill should exclude, as does the Senate bill, intramural research from the base against which the set-aside is calculated. This base should be the budget for extramural research and development. Many of an agency's R&D activities can best be performed intramurally, and funds available for these often unique tasks should not be diminished unless the agency's mission can be served better by the private sector.

Finally, we are concerned that there appear to be a number of ways potential applicants could meet the letter but fail to fulfill the spirit of the SBIR Program and, in so doing, engage in real or apparent abuses that would erode public confidence in the endeavor.

- Non-biomedical research companies could try to qualify for funding by placing an overlay of scientists in their structure but still lack the real manpower or facility capability to perform high quality basic biomedical research.

- Universities/hospitals which do have the requisite scientific resources could be encouraged to establish subsidiary business corporations.

- Small businesses with insufficient research resources may simply contract out to universities/hospitals all or most of the research funded under the set-aside--with a probable increase in research costs.

We believe, however, that these potential problems can be addressed through application of existing regulations, plus regulations drafted to implement this bill.

While our concerns are such that we cannot support the House bill as written, we have consistently indicated that we are prepared to increase our efforts to involve small businesses in our programs, and that is why we support passage of S. 881.

Enclosed are our responses to the additional questions included in your November 30, 1981, letter to me.

We are advised by the Office of Managment and Budget that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely,

Secretary

Enclosure

1) A brief description of your existing practices for complying with all applicable statutes relating to small business.

Set-Asides

It is the policy of the Department of Health and Human Services to place a fair proportion of our purchases and contracts with Small Businesses, Small Disadvantaged Businesses, Labor Surplus Area Program, and Women-Owned Business Concerns. The NIH is given a goal at the beginning of the fiscal year in each of these categories by the Department.

- Small Business Set-Aside: The small business set-aside program is the method by which Federal procurements are awarded through a competition restricted exclusively to small business concerns. Statutory authority for this program was provided in the "Small Business Act of 1958" and is carried out under the Federal Procurement Regulation (FPR1-1.7)(Department of Health and Human Services Regulation HHS PR3-1.7). A 100 percent small business set-aside is appropriate when there is a reasonable expectation that bids or proposals will be obtained from a sufficient number of qualified small business concerns, so that awards will be made at a reasonable price (FPR 1-1.7). Under the 1978 amendment to the Small Business Act, all procurements of less than $10,000, which are subject to small purchase procedures, must be reserved for small business concerns unless small business firms are not available to perform at competitive market prices (Authority: OFPP Letter 80-6). For the purposes of Government procurement, a small business is a concern which: is independently owned and operated; is not dominant in the field or industry in which it is bidding on Government contracts; and fits the size standards established by the Federal Procurement Regulation for that industry.

- The SBA 8(a) Program: The primary mechanism by which we make awards to socially and economically disadvantaged business concerns is the 8(a) Program. Section 8(a) of the Small Business Act authorizes the Small Business Administration (SBA) to enter into contracts with Federal Agencies for supplies, services, and construction, and then arrange for the performance of such contracts by letting subcontracts to "socially and economically disadvantaged firms." This process known as the 8(a) Program is utilized by the Federal Government to assist disadvantaged firms to become self-sustaining and capable of achieving a competitive position. The 8(a) Program provides an exception to normal competitive requirements to enable disadvantaged firms to secure contract awards. P.L. 95-507 gives SBA statutory authority for the 8(a) Program.

- The Labor Surplus Area Program: It is the policy of the Department of Health and Human Services to award contracts with eligible labor surplus area concerns. P.L. 95-89 directs Federal procurement agencies to use their best efforts to award contracts to concerns in areas having surplus labor. Labor surplus areas are geographical areas identified by the Secretary of Labor on an annual basis as an area that has an unemployment rate during a reference period (usually a year) 1.20 times the national average unemployment rate for the same period. A labor surplus area concern is a concern that is located in or agrees to perform substantially (at least 50 percent of the contract) in the labor surplus area. The LSA program is applicable to all Federal procurements exceeding $2,500. Federal agencies are required to set aside an entire procurement, or class of procurements when there is a reasonable expectation that bids or proposals will be obtained from a sufficient number of concerns so that awards will be made at a reasonable price. The Conte Amendment to DHHS's FY 80 Appropriation Bill prohibits the awarding of LSA set-asides when the work involves research, rehabilitation, training, or other highly professional health, education, and social services which will not substantially affect employment levels.

- Subcontracting: Section 211 of the 1978 amendments to the Small Business Act (P.L. 95-507) requires that all prime contractors on Federal contracts of $1,000,000 or more for construction and $500,000 for other contracts, submit, before award, a plan for awarding subcontracts to small businesses, women-owned, and disadvantaged businesses. (The authority for this program is found in Section 8(b) and Section 8(d) (1,2,3 and 4) of the Small Business Act.) The Contracting Officer determines whether to approve or disapprove a proposed subcontracting plan. The Small Business Administration and the operating agencies' Small and Disadvantaged Business Utilization Specialist will review and make advisory recommendations to the Contracting Officer regarding the Subcontracting Plan. The substantial involvement which the Project Officer or Program Official has with the contractor can serve to influence the contractor to create opportunities for Small Businesses, Women-Owned Businesses and Disadvantaged Businesses.

- Women Business Enterprise Programs: On May 18, 1979, the President signed Executive Order 12138, creating a National Women's Business Enterprise Policy. At the same time, he prescribed arrangements for developing, coordinating, and implementing a national program for women business enterprise. Each department and agency of the Executive Branch was directed, within the constraints of statutory authority and as otherwise permitted by law, to take appropriate action to facilitate, preserve, and strengthen Women's Business Enterprises, and to ensure full participation by women in the free enterprise system. The order includes the following definitions: "Women-owned business" means a business that is at least 51 percent owned by a woman or women who also control and operate it. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day-to-day management.

In the area of program direction and operation, agencies are expected to:

1. Develop a comprehensive source list of women business concerns.

2. Mail copies of selected RFPs and IFBs to appropriate women concerns on the source list.

3. Consistent with valid considerations such as price feasibility, specifically encourage the placement of small purchases with women businesses.

4. Counsel women business owners with respect to business opportunities.

5. Coordinate inquiries and requests for advice from women business concerns on procurement matters.

6. Advise women business concerns of financial, management, and technical assistance available from Federal agencies and business development organizations.

7. Participate in the review of prime contractor's subcontracting programs to assure that women businesses are fairly considered.

8. Assure that the participation of women business concerns in the procurement program is accurately reported.

9. Develop an outreach program to acquaint women business owners with the Department's procurement program.

Competitive Awards

- In FY 80 NIH awarded approximately $400 million in R&D contracts. Of this amount $31 million was awarded to small businesses in open competition. The majority of these contracts have resulted from competition with all sectors of the biomedical research community. The NIH has awarded competitive contracts to small business firms in the following areas:

--Preparation of Bulk Chemicals and Drugs

--Development and Testing of a New Biodegradable Drug Delivery System

--Restoring and Refurbishing Infrared Heterodyne Radiometer

--Development of an Implantable Left Heart Assist System

--Electrical Energy Transmission Technique Development

--Comparison of Fluorides in Caries Prevention

--Resynthesis of Bulk Chemicals and Drugs

--Production of Clinical Doses of Anti-tumor Agents

--Follow-up and Toxicity Blood Determinations - LRC Patients

--Central Laboratory for Propranolol Heart Trial

--Services for Cancer Related Inquiries

--Establish Clinical Immunology Diagnostic Laboratory

--Virology, Immunology, Tissue Culture Support Service

--Cytogenetic Evaluation of High Risk Cancer Families

--Development of New Methods of Single Cell Separation

--Develop Progestagen Containing Microcapsules

--Measure Pulmonary Functions in Infants and Children

--National Clearinghouses (ex. Rheumatic Diseases)

--Support services for Various Programs (like the DCRRC-NCI)

--Planning and Analytical Support Services

--Evaluation Studies

--Synthesis of Various Phosphoramides

--Laboratory Mouse Breeding Facility

--Production of RNA Avian Oncogenic Viruses

--Evaluation of Electrode Materials

--Support the Gastrointestinal Tumor Study Group

--Pathology Support for Carcinogenesis Testing Program

--Processing Cultured Tissues and Cells

--Examine Embryonic Kidney Nephroblastomas

--Production of Lipopolysaccharides (Endotoxins)

--Primary Genetic Center for Germfree Rodents

--Production of Aged Rats

--Carcinogenicity and Toxicity Study in Laboratory Animals

--Study of the Marek's Disease Herpes Virus

--Produce Avian Leucosis Viruses

--Prepare Desoctapeptide Insulin and Chicken Insulin

- Grants to For-profit Firms: Recently the Department removed the restriction on providing grants to for-profit firms, thus permitting small as well as large profit-making organizations to submit investigator-initiated research proposals and compete for the approximately $2.0 billion of research grants awarded annually. This action offers small businesses in the biomedical area the opportunity to participate fully in the Department's major grant supported research programs. The only limitation will be the ability to perform quality research.

NIH Efforts to Establish Contact with Small Businesses

1. Presentations about the small business program to various NIH scientific committees.

2. Reviews of requests for contracts and contract planning documents by the Small and Disadvantaged Business Utilization Specialists and by the Collaborative Program Procedures Officer in order to identify work that can be performed by small and disadvantaged firms.

NIH staff recommend for set aside procurements those which are relevant to the known expertise of small and disadvantaged firms which staff already have identified from previous discussions.

3. Attendance at conferences and fairs by NIH contracting and program officials for the purpose of locating small and disadvantaged businesses with biomedical research and development capabilities.

During 1980 and 1981, one or more NIH staff members attended six such conferences.

4. Issuance of two separate sources sought announcements in the Commerce Business Daily and advertisement in the American Association of Small Research Companies Newsletter for the purpose of identifying firms with biomedical research and development expertise.

5. Interviews on a frequent basis with representatives of small and disadvantaged firms to discuss their capabilities and to inform them of the procedures for participating in the NIH research contracting program.

Several dozen of these firms contact NIH staff annually as a consequence of learning of the NIH mission from attendance at conferences and scientific meetings.

6. Training of program staff at regularly scheduled courses for Project Officers' to inform them about the various small and disadvantaged business promotion programs and initiatives.

All NIH project officers and scientists who will participate in review activities are required to undergo this training activity. Most of the approximately 600 NIH project officers have completed the courses.

7. The recent sponsoring, in conjunction with the Public Health Service, of a conference for a number of the larger prime contractors to discuss subcontracting initiatives under Public Law 95-507. We

view this as a particularly important mechanism, since we share the view of the GAO in its report to the Congress, titled "Consistent Criteria are Needed to Assess Small Business Innovation Initiatives," that in mixed industries where small firms must compete with larger firms, small businesses are likely to be complimentary rather than primary contributors. "Their innovations are frequently components or subcomponents of larger systems." The applied biomedical research industry remains, to a large extent, mixed with a predominance of larger organizations; it is too early to tell whether the advent of recombinant DNA and hybridoma (cell fusion) technology will alter this balance substantially.

8. The formation of committees of program officials to identify specific biomedical programs eligible for small business set-asides; to assess the capabilities of small businesses with biomedical expertise; to assess the capabilities of small businesses with biomedical expertise; and to disseminate these findings to relevant program areass. One such committee has supplied its recommendations. Others are being constituted.

2) A concise statement of the additional personnel, time, and other budgetary amounts required to implement both H.R. 4326 and S.881 (using tabular material, to the extent possible.

The major personnel and budgetary impact on the NIH for implementing either H.R. 4326 or S.881 will be the increased cost of reviewing the proposals for scientific merit and for relevance to the NIH mission and to the intent of the proposed SBIR program. The increased costs do not include the actual set aside to fund the SBIR projects.

In order to provide the basis for estimating the increased time, personnel and monetary expenditures, a brief summary of on-going practices is relevant.

At the present time the Division of Research Grants (DRG) of the NIH receives about 27,000 grant applications per year from the outside academic and non-profit community. Of this number, about 22,000 are relevant to NIH programs and are processed through the NIH peer review system. DRG refers the remainder to other Governmental agencies when these applications are more relevant to such agencies. Most (about 20,000) of the former group are assigned to and reviewed by Initial Review Groups (IRGs), also called study sections, administered by DRG. The remainder are reviewed by IRGs in the relevant institutes of the NIH. The IRGs consist of approximately 80 groups of scientists chosen for specific types of expertise in the biomedical sciences. Almost all of these scientists are affiliated with non-profit and academic institutions.

The intent of the NIH is to utilize these IRGs to review applications which will be invited as a consequence of the implementation of the SBIR program. A review of the Congressional Record, December 7, 1981, indicates that, with respect to the NIH, the Senate has encouraged the use of NIH's ongoing peer review system. The NIH, however, would propose to augment this system in two ways in order to handle adequately the SBIR applications:

1) Use of additional outside consultants -- The increase in workload will require additional members on these IRGs.
2) Use of scientists from the for-profit sector -- Because of the nature of the proposed SBIR program, scientists oriented towards the for-profit enterprise will be required in order to provide the fairest possible review of applications. The NIH will invite nominations and volunteers from this group through its widely distributed NIH Guide for Grants and Contracts. The required numbers and types of expertise of the additional reviewers are difficult to estimate; however, rough figures are provided in the chart below and are based principally on past experience, both with applications from the non-profit sector and with what the NIH now knows of small businesses with expertise relevant to the NIH programs.

The assumption made is also that a sufficient number of applications will appear to provide enough fundable ones of high technical merit. Clearly the Congress, in its support for these bills, believes that this type and quantity of expertise exists in the small business community.

Since the set-aside will not appear as increased appropriations, NIH must take it from existing programs; as a consequence no additional cost is shown for managing the SBIR projects.

Table 1

Cost of Implementing SBIR Program

		S.881	H.R. 4326
Year 1	Initial communication to S.B. community*	$100,000	$100,000
	Additional Consultants Expense	$175,000	$175,000
	Additional cost of staff effort	$125,000	$125,000
	Increased req of data system	50,000	50,000
	Total	$450,000	$450,000
Year 2	consultant expense	$250,000	$350,000
	staff effort	$100,000	$100,000
	data system	$ 15,000	$ 15,000
	Total	$365,000	$465,000
Year 3	consultant expense	$350,000	$450,000
	staff effort	$125,000	$150,000
	data system	$ 25,000	$ 35,000
	Total	$500,000	$635,000
Year 4	consultant expense	same	$550,000
	staff	same	$175,000
	data	same	$ 45,000
		$500,000	$770,000

		S.881	H.R. 4326
Year 5	consultant	same	$650,000
	staff	same	$200,000
	data	same	$ 50,000
		$500,000	$900,000

*cost of regional conferences with S.B. representatives (a non-recurring cost)

3) Discussion of how the practices set forth in 1) above would be modified to carry out the provisions of H.R. 4326 and S.881 if enacted.

In addition to the above list of existing practices for complying with all applicable statutes relating to small business, the following activities account for the remainder of the NIH extramural budget: grants and cooperative agreements with non-profit organizations; contracts with all sectors of the biomedical R&D community (most are won competitively and a small number result from noncompetitive procurements); and traineeships and fellowships.

From this entire portfolio, only a minor portion (approximately one-third) is available for annual competition since an initial commitment on any type of award implies continued funding through the competitive segment of the project, usually until the initial scope of the work has been completed, since the initial award of a grant usually carries with it a promise or commitment to provide funds annually for the subsequent 3 to 5 years. As a consequence, the SBIR set aside will require the use of those funds not already committed to ongoing projects. The intent of the SBIR program, as outlined in S.881 and in H.R. 4326, is that existing small business initiatives may not count toward the fulfillment of the SBIR requirements. Furthermore, present laws and policies prescribe that these other initiatives continue. As a consequence, any modification for the SBIR program will really involve an extension of two existing practices:

Grants to for-profit organizations -- The recently adopted policy providing grant eligibility to for-profit firms will be extended further by two methods:

1. An open request for grant applications (RFAs) from any and all small businesses which qualify under the SBIR programs. This notice

will specify only relevance to the NIH mission and to the intent of the SBIR program. The approach is an entirely new one for the use of RFA announcements at the NIH since all previous ones have invited applications in specific program areas. These announcements will provide for possible funding either as grants or as cooperative agreements, depending on the type of the application and on the degree of involvement of the NIH in the activity.

2. A series of specific sources sought announcements and RFAs -- The NIH will utilize these only when expertise clearly relevant to a specific NIH program activity and to the SBIR program is known to exist in the small business community. This approach is, in part, an extension of the present set aside programs for small, 8(a), and women-owned businesses. Currently the NIH funds these activities only under the contract instrument. None of the additional existing practices outlined in 1) above is relevant to the SBIR program.

United States Department of the Interior
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

APR - 8 1982

RECEIVED
[illegible]
COMMITTEE ON SCIENCE
AND TECHNOLOGY

Honorable Don Fuqua
Chairman, Committee on Science
and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Thank you for your letter of November 30, 1981, to Secretary James G. Watt, which provides the Department of the Interior the opportunity to comment on H.R. 4326 and S. 881. The bills propose to establish small business innovation research programs.

We have prepared the enclosed comments and background material which you requested:

Enclosure	I -	Comments on H.R. 4326 and S. 881
Enclosure	II -	Implementation of existing Small Business Statutes; Testimony before House Small Business Subcommittee dated September 22, 1981
Enclosure	III -	Additional Resources Needed to Implement H.R. 4326 and S. 881
Enclosure	IV -	Impact of H.R. 4326 and S. 881 on Existing Small Business Practices

We have not had any prior correspondence with Congress on either bill.

We support the effort to encourage innovative research by small businesses in order to help reestablish our national position in technological advancement. S. 881 would more effectively accomplish this objective with fewer resources and less impact on other existing small business programs. We would not request additional resources to implement this legislation.

The Office of Management and Budget has advised that there is no objection to the presentation of the report from the standpoint of the Administration's program. If we can be of further assistance, please let us know.

Sincerely,

Donald Paul Hodel

UNDER SECRETARY
Donald Paul Hodel

Enclosures

Enclosure I

DEPARTMENT OF THE INTERIOR
COMMENTS ON SENATE BILL S. 881 AND HOUSE
BILL H.R. 4326

We support the objective of both bills, which is to stimulate technological innovation by encouraging small businesses, which are the major contributors to innovation in this country.

We have analyzed and compared the proposed legislation on the three major issues which follow. Because of time constraints we were unable to obtain the formal views of our bureau and office research activities to determine the full impact of the legislation.

1. Small Business Innovation Research Program

A Small Business Innovative Research Program (SBIR) is a program under which a portion of a Federal agency's research or research and development effort is reserved for award to small business concerns through a uniform process.

H.R. 4326 (Section 4(f) & (g)): Each agency with a research and development (R&D) budget which annually exceeds $100 million must establish a Small Business Innovative Research (SBIR) program in which 3% of their annual R&D budget is set aside for small business within 4 years.

S. 881 (Sections 3(2)(c)&(b)): Each agency with an adjusted $300 million available for research and development (as derived from a prescribed formula) must establish a Small Business Innovation Research Program in which 1% per year is set aside for small business (a phase-in period of 3 years is permitted for agencies with budgets exceeding $2 billion).

Comments: Based on budgetary information which we prepared in 1981 for the National Science Foundation's Federal Funds for Research and Development Series and for our Interior Fiscal Year 1982 budget, we have determined that the Department of the Interior would not be subject to the mandatory SBIR program requirements of S. 881, but we would be subject to the SBIR program requirements of H.R. 4326.

We used the following formula prescribed in S. 881, Section 3(2)(c)(2) to determine that Interior would not be subject to the SBIR program requirements of the Senate bill:

	FY '80 (actual in millions)	FY '82 (estimate in millions)
1. Total R&D Funds Obligated	$437.5	$391.0
2. R&D Obligations to non-profit and for-profit institutions	$ 79.6 = 18.2% of 1	$ 71.2 = 18.2 % of 1
3. Calculate 1% of 2; if greater than $3 million, S. 881 Section 3(2)(c) & (b) apply	N/A	$ .71

We would have a problem complying with the H.R. 4326 requirements because we would be restricted to a relatively high percentage of set-aside awards under a limited solicitation method. If this bill were enacted as is, we would have to restructure the budget, planning, and solicitation processes within our bureaus and offices.

Contract award information extracted from the Interior Procurement Data System indicates that such a 3% mandatory set-aside would be difficult to achieve and would not allow for fluctuations in our R&D programs. This is especially true if the SBIR were limited to the solicitation method prescribed in H.R. 4326, Section 4(e)(3). Our Fiscal Years 1980 and 1981 small business contract accomplishments indicate that approximately .96% and .9%, respectively, of total R&D obligations were set aside for small business. Based on a preliminary review, none of these awards were made by using this solicitation method.

For the above reasons, we recommend that H.R. 4326 be amended to revise the mandatory small business set-aside amount from 3% to 1% within 3 years.

We also recommend that the solicitation method prescribed by H.R. 4326, Section 4(e)(3) and S. 881, Section 4(j)(e), be designated as the preferred method, rather than the sole method, for accomplishing R&D awards to small businesses. On other set-asides, and even in open competition for research and development the evaluation criteria could be weighted to stimulate and reward innovation by small businesses.

At Interior we are also exploring incentives for making R&D awards to small businesses. These efforts are outlined on pages 6 through 8 of Enclosure II.

2. Annual Goals for Small Business R&D Funding Agreements

H.R. 4326 (Section 4(i)): Agencies with an annual R&D budget in excess of $20 million must establish annual Small Business R&D goals in addition to the SBIR goals, which are not less than the percentage of the preceding year's expenditures.

S. 881 (Section 3(c)(1)(A)): Agencies with annual R&D obligations in excess of $100 million must establish annual Small Business R&D goals which are not less than the percentage of the previous year's expenditures.

Comments: Based on our experience with the goal-setting process under P.L. 95-507, we agree that goals for R&D non-set-aside small business awards should be separately established as a percentage of the total R&D. Also, we concur with the S. 881 language of Section 3(2)(c)(1)(a) which permits agencies to unilaterally establish this R&D goal.

Although we would do our utmost to ensure that our goal accomplishments are not less than the preceding year's expenditures, cutbacks in specific R&D programs may disproportionately affect awards to small businesses.

A major factor in achieving not only the annual goals, but also the mandatory set-aside awards would be a concentrated effort by SBA to maintain a comprehensive and current file/source list on R&D (see Section 3 of both bills). Agencies could then identify potential sources and the potential for competition in developing goals. The information submitted to SBA under Section 4 of both bills could be used as a data base.

3. Authority to Issue Policy Directives for the Small Business Innovation Research Program

H.R. 4326 (Section (4)(j)): SBA would have the authority to issue policy directives concerning the SBIR program.

S. 881 (Section 3(e)): OFPP would have the authority to issue policy directives concerning the SBIR program.

Comments: We recommend that OFPP, rather than SBA, issue the directives listed in Section 4(j) (1) through (3) of H.R. 4326, because these directives relate directly to the procurement process. OFPP should, however, coordinate with SBA (see S. 881 Section 3(2)(e)) in preparing these regulations and SBA should retain program authority for the SBIR.

Also, Section 3 of H.R. 4326, Subsection (5) would be more effectively handled by the Federal agencies through the *Commerce Business Daily*, source lists, and by contact with small business associations.

Enclosure II

IMPLEMENTATION OF EXISTING SMALL BUSINESS STATUTES

Congressional Testimony of September 22, 1981,
before the House Small Business Subcommittee
on Export Opportunities and Special
Small Business Problems

STATEMENT OF CHARLOTTE BROOKS SPANN
DIRECTOR, OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION
DEPARTMENT OF THE INTERIOR

MR. CHAIRMAN, MEMBERS OF THE COMMITTEE

I AM CHARLOTTE BROOKS SPANN, DIRECTOR, OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION, DEPARTMENT OF THE INTERIOR. I WELCOME THIS OPPORTUNITY TO SUBMIT TESTIMONY, IN RESPONSE TO YOUR INVITATION TO SECRETARY WATT TO DISCUSS THE DEPARTMENT OF THE INTERIOR'S SUPPORT OF SMALL BUSINESS AND, IN PARTICULAR, TO RESPOND TO THE SPECIFIC INQUIRIES RAISED IN YOUR LETTER OF SEPTEMBER 3, 1981. THE DEPARTMENT OF THE INTERIOR IS ESPECIALLY PROUD OF THE GREAT STRIDES IT HAS MADE IN ITS CONTINUING EFFORT TO BUILD A STRONG AND EFFECTIVE SMALL BUSINESS PROGRAM. DURING EACH OF THE PAST FOUR FISCAL YEARS, THE DEPARTMENT HAS AWARDED MORE THAN 40 PERCENT OF ITS TOTAL PROCUREMENT DOLLARS TO SMALL BUSINESS. THIS RECORD IS WELL ABOVE THE NATIONAL AVERAGE, WHICH IN FISCAL YEAR 1980 WAS 23.6 PERCENT. MR. CHAIRMAN, FOR THE RECORD, I SHALL RESPOND TO ITEMS (A) THROUGH (E) IN THE SAME SEQUENTIAL ORDER IN WHICH THEY WERE PRESENTED IN YOUR LETTER OF

SEPTEMBER 3, 1981. SHOULD YOU OR THE COMMITTEE DESIRE ADDITIONAL INFORMATION OR FURTHER ASSISTANCE, I SHALL BE HAPPY TO RESPOND TO ANY OF YOUR CONCERNS OR QUESTIONS.

ITEMS (A) AND (B). WITH REGARD TO SPECIFIC PROGRAMS DESIGNED TO AID SMALL BUSINESSES AND ANY SPECIAL OFFICES OR INDIVIDUALS ASSIGNED TO ASSIST SMALL BUSINESSES

THE PRIMARY MISSION OF INTERIOR'S OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION (OSDBU) IS TO IMPLEMENT AND ADMINISTER PROGRAMS DESCRIBED UNDER SECTIONS 8 AND 15 OF THE SMALL BUSINESS ACT, AS AMENDED BY PUBLIC LAW 95-507. MORE SPECIFICALLY, OSDBU IS RESPONSIBLE FOR:

- PROVIDING DEPARTMENT-WIDE LIAISON AND COORDINATION IN ALL MATTERS RELATED TO SMALL AND DISADVANTAGED BUSINESS;

- ASSISTING BUREAUS AND OFFICES IN THE DEVELOPMENT AND IMPLEMENTATION OF POLICIES AND PROCEDURES REQUIRED BY SECTIONS 8 AND 15 OF THE SMALL BUSINESS ACT AND OTHER AUTHORITIES, INCLUDING THE ESTABLISHMENT OF GOALS AND THE REPORTING OF ACCOMPLISHMENTS;

- CONSULTING REGULARLY WITH THE SMALL BUSINESS ADMINISTRATION CONCERNING THE INTERPRETATION AND FUNCTIONAL REQUIREMENTS OF SECTIONS 8 AND 15 OF THE SMALL BUSINESS ACT;

- PROVIDING TRAINING AND EDUCATION TO DEPARTMENT PERSONNEL WHOSE FUNCTIONAL RESPONSIBILITIES RELATE TO THE IMPLEMENTATION OF SECTIONS 8 AND 15 OF THE SMALL BUSINESS ACT;

- RESEARCHING, DEVELOPING AND PUBLISHING INFORMATIONAL BROCHURES AND DOCUMENTS RELATING TO INTERIOR'S SMALL AND DISADVANTAGED BUSINESS PROGRAMS;

- CONDUCTING OUTREACH SEMINARS AND PROVIDING ON-GOING LIAISON SERVICES AND ASSISTANCE TO SMALL, DISADVANTAGED, LABOR SURPLUS AREA, AND WOMEN'S BUSINESS ENTERPRISE CONCERNS;

- INITIATING THE DEVELOPMENT AND PUBLISHING OF PROCUREMENT POLICY, PROCEDURES AND GUIDELINES AS THEY RELATE TO THE IMPLEMENTATION OF INTERIOR'S SMALL AND DISADVANTAGED BUSINESS PROGRAMS;

- CONDUCTING REVIEWS OF DETERMINATIONS OF PROPOSED RULEMAKING ACTIVITIES TO DETERMINE THEIR SIGNIFICANCE AND ECONOMIC IMPACT ON SMALL ENTITIES IN ACCORDANCE WITH THE REQUIREMENTS OF THE REGULATORY FLEXIBILITY ACT;

- PROVIDING CONTINUOUUS TECHNICAL ASSISTANCE AND GUIDANCE TO BUREAUS AND OFFICES IN SUPPORT OF THEIR EFFORTS TO MEET MISSION OBJECTIVES AND INCREASE OPPORTUNITIES FOR THE TARGET GROUPS OF INTERIOR'S PROCUREMENT PREFERENCE PROGRAMS.

MR. CHAIRMAN, THESE ARE SOME OF THE MORE CRITICAL FUNCTIONS AND RESPONSIBILITIES IN SUPPORT OF SMALL BUSINESSES THAT FALL UNDER THE DIRECT PURVIEW OF MY OFFICE. IN ADDITION, EACH OF OUR MAJOR BUYING OFFICES HAVING ANNUAL PROCUREMENTS OF $20 MILLION OR MORE IS REQUIRED TO HAVE AT LEAST ONE FULL-TIME BUSINESS UTILIZATION AND DEVELOPMENT SPECIALIST ASSIGNED TO OVERSEE AND IMPLEMENT INTERIOR'S SMALL AND DISADVANTAGED BUSINESS PROGRAM WITHIN THEIR RESPECTIVE BUREAUS.

BEING A DIVERSE AGENCY WITH VAST RESPONSIBILITIES, INTERIOR RECOGNIZES THAT THERE ARE OTHER AREAS WITHIN THE DEPARTMENT THAT ALSO LEND THEMSELVES TO THE ACTIVE PARTICIPATION OF SMALL BUSINESSES. ONE SUCH AREA IS FOUND IN OUR BUREAU OF LAND MANAGEMENT'S (BLM) COAL LEASING PROGRAM. IN MARCH, 1980, THE DEPARTMENT OF THE INTERIOR ENTERED INTO A MEMORANDUM OF UNDERSTANDING (MOU) WITH THE SMALL BUSINESS ADMINISTRATION IN WHICH INTERIOR HAS AGREED TO SET-ASIDE SPECIFIC TRACTS OF FEDERALLY-OWNED COAL LANDS FOR THE EXCLUSIVE PARTICIPATION OF SMALL BUSINESS CONCERNS. WITHIN THE CONTEXT OF THE MOU IS THE UNDERSTANDING THAT INTERIOR SHALL MAKE EVERY REASONABLE EFFORT TO ASSURE THAT A PRE-DETERMINED NUMBER OF LEASABLE COAL TRACTS ARE SET-ASIDE FOR SMALL BUSINESS CONCERNS BEGINNING WITH THE 1981 COAL LEASE SALES. TO DATE, THE DEPARTMENT HAS SET THREE SUCH TRACTS ASIDE FOR EXCLUSIVE AWARD TO SMALL BUSINESSES.

IN AN EFFORT TO FURTHER AUGMENT THE PROGRAM, THE BUREAU OF LAND MANAGEMENT HAS HIRED A FULL-TIME SMALL BUSINESS COAL LEASING SPECIALIST WHOSE PRIMARY RESPONSIBILITY IS TO REPRESENT THE INTERESTS OF SMALL BUSINESS UNDER THE COAL LEASE SET-ASIDE PROGRAM.

THE DEPARTMENT OF THE INTERIOR AND THE SMALL BUSINESS ADMINISTRATION ALSO EXECUTED AN MOU IN MARCH, 1959 (AMENDED JULY, 1966) WHICH ESTABLISHED A BASIC FRAMEWORK FOR A SMALL BUSINESS SET-ASIDE TIMBER SALES PROGRAM FROM LANDS ADMINISTERED BY BLM. THE DEPARTMENT'S AUTHORITY FOR INITIATING THIS AS WELL AS THE COAL LEASE SET-ASIDE PROGRAM IS THE SMALL BUSINESS ACT OF 1958 WHICH DECLARES THAT A FAIR PORTION OF THE TOTAL SALES OF GOVERNMENT PROPERTY SHALL BE MADE TO SMALL BUSINESS ENTERPRISES. THE DEPARTMENT'S SET-ASIDE PROGRAM FOR TIMBER SALES HAS BEEN FUNCTIONING IN WESTERN OREGON SINCE 1974 WHERE BLM TIMBER SALES TOTAL APPROXIMATLEY 1.1 BILLION BOARD FEET ANNUALLY. OVER THE PAST FIVE YEARS 25 PERCENT OF SUCH SALES HAVE BEEN SET-ASIDE FOR THE EXCLUSIVE PARTICIPATION OF SMALL BUSINESSES.

IN MAY, 1980, THE DEPARTMENT OF THE INTERIOR PUBLISHED A FINAL RULE OUTLINING SPECIFIC AFFIRMATIVE ACTION THAT WOULD BE TAKEN TO CARRY OUT THE REQUIREMENTS OF SECTION 17 OF THE ALASKA NATURAL GAS TRANSPORTATION ACT. THE RULE ESSENTIALLY STATES THAT NO PERSON SHALL BE EXCLUDED ON THE GROUNDS OF RACE, CREED, COLOR, NATIONAL ORIGIN OR SEX FROM PARTICIPATING IN ANY ACTIVITY CONNECTED WITH THE CONSTRUCTION AND OPERATION OF THE ALASKA NATURAL GAS TRANSPORTATION SYSTEM. ONE OF THE PRIMARY OBJECTIVES OF THE RULE

IS TO SUBSTANTIALLY INCREASE THE PROCUREMENT AND SUBCONTRACTING OPPORTUNITIES OF SMALL/MINORITY AND WOMEN-OWNED BUSINESSES.

ITEM (C): WITH REGARD TO ANY PUBLICATIONS OF INTEREST TO SMALL BUSINESSES

IN DECEMBER, 1980, THE DEPARTMENT PUBLISHED A CONTRACTING GUIDEBOOK ENTITLED "THIS IS INTERIOR." THE PRIMARY PURPOSE OF THIS 55-PAGE GUIDEBOOK WAS TO ASSIST SMALL AND DISADVANTAGED BUSINESSES IN THEIR MARKETING EFFORTS WITH THE DEPARTMENT OF THE INTERIOR. THE GUIDEBOOK IDENTIFIES THE MAJOR BUYING OFFICES WITHIN INTERIOR INCLUDING A BRIEF NARRATIVE DESCRIPTION OF THE PRIMARY GOODS OR SERVICES PURCHASED BY EACH OFFICE. FURTHER, IT INCLUDES THE NAMES, ADDRESSES, AND TELEPHONE NUMBERS OF KEY CONTRACTING OFFICERS AND BUSINESS UTILIZATION AND DEVELOPMENT SPECIALISTS. THE GUIDEBOOK HAS BEEN WELL-RECEIVED AND HIGHLY PRAISED BY THE SMALL BUSINESS COMMUNITY AND MORE THAN 5,000 COPIES HAVE BEEN ISSUED TO DATE.

WITHIN THE PAST TWO MONTHS THE DEPARTMENT DEVELOPED AND PUBLISHED A 53-PAGE SMALL BUSINESS RESEARCH AND DEVELOPMENT (R&D) DIRECTORY FOR USE AS AN R&D SOURCE AID FOR DEPARTMENTAL PROGRAM AND PROCUREMENT OFFICIALS. THE DIRECTORY CONTAINS A LIST OF SMALL BUSINESS R&D FIRMS HAVING CAPABILITIES UNIQUE TO THOSE NEEDED TO MEET INTERIOR'S NATURAL RESOURCE R&D CONTRACTUAL REQUIREMENTS. THE DIRECTORY WHICH IS CATEGORIZED BY STATE, GIVES THE NAMES AND ADDRESSES OF THE FIRMS, THE NAME AND TELEPHONE NUMBER OF A KEY CONTACT PERSON, AND A BRIEF DESCRIPTION OF EACH FIRM'S R&D CAPABILITIES. AS A

COROLLARY TO THIS EFFORT, WE ARE ALSO IN THE PROCESS OF DEVELOPING AND PUBLISHING A LIST OF ALL OF THE DEPARTMENT'S R&D PROGRAMS INCUDING AN IDENTIFICATION OF THE DEPARTMENT'S MAJOR R&D BUYING OFFICES, A BRIEF DESCRIPTION OF THE R&D ACTIVITIES OF EACH OFFICE, AND THE NAME AND TELEPHONE NUMBER OF A KEY CONTACT PERSON. THIS PROJECT IS SCHEDULED FOR COMPLETION ON SEPTEMBER 30, 1981, AFTER WHICH THE BOOKLET WILL BE PUBLISHED AND APPROPRIATELY DISTRIBUTED TO THE SMALL BUSINESS R&D COMMUNITY.

LASTLY, THE DEPARTMENT RECENTLY PUBLISHED A GUIDE TO BUSINESS AND ECONOMIC DEVELOPMENT PROGRAMS WHICH IS ESSENTIALLY A 4-PAGE DOCUMENT CONTAINING THE AUTHORITY AND ORGANIZATIONAL PROFILE OF THE OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION INCLUDING A BREAKDOWN OF ITS MISSION AND OBJECTIVES AS WELL AS RECENT SELECTED PROGRAM ACHIEVEMENTS.

MR. CHAIRMAN, I WOULD BE PLEASED TO PROVIDE YOU WITH A COPY OF EACH OF THE AFOREMENTIONED PUBLICATIONS IF YOU SO DESIRE.

ITEM (D): WITH REGARD TO ANY SIGNIFICANT ACTIONS RECENTLY UNDERTAKEN OR PLANNED IN THE NEAR FUTURE TO ASSIST SMALL BUSINESSES

ONE OF THE MORE SIGNIFICANT ACTIONS BEING PLANNED BY THE DEPARTMENT TO ASSIST SMALL BUSINESSES IS THE ESTABLISHMENT OF A SMALL BUSINESS CLASS SET-ASIDES FOR SELECTED CATEGORIES OF INTERIOR'S R&D AND ARCHITECTURAL AND ENGINEERING (A&E) REQUIREMENTS. THE DEPARTMENT RECENTLY CONLUDED A COMPREHENSIVE STUDY OF ITS R&D AND A&E PROGRAMS

IN AN EFFORT TO DETERMINE THE FEASIBILITY OF ESTABLISHING ADDITIONAL CLASS SET-ASIDES FOR INTERIOR R&D AND A&E REQUIREMENTS. THE RESULTS OF THE STUDY HAVE BEEN ANALYZED AND THE DEPARTMENT IS PLANNING, AS ONE OF ITS FY '82 OBJECTIVES, TO PROPOSE THE ESTABLISHMENT OF A CLASS SET-ASIDE FOR ALL A&E REQUIREMENTS OF $50,000 OR LESS. A&E REQUIREMENTS OF MORE THAN $50,000 WOULD BE SET-ASIDE ON A CASE-BY-CASE BASIS AT THE DISCRETION OF THE CONTRACTING OFFICER. IN CONCERT WITH THIS OBJECTIVE, THE DEPARTMENT IS ALSO PLANNING TO PROPOSE A ONE-YEAR PILOT PROGRAM FOR A CLASS SET-ASIDE OF SPECIFIC CATEGORIES OF R&D REQUIREMENTS.

THE DEPARTMENT WILL PROPOSE, AS ANOTHER OF ITS FY '82 OBJECTIVES, TO INCREASE THE DEPARTMENTAL DOLLAR THRESHOLD FOR THE CLASS SET-ASIDE OF CONSTRUCTION REQUIREMENTS FROM ITS CURRENT THRESHOLD OF $750,000 TO $1 MILLION. CONSTRUCTION REQUIREMENTS OF MORE THAN $1 MILLION WOULD BE SET-ASIDE ON A CASE-BY-CASE BASIS AT THE DISCRETION OF THE CONTRACTING OFFICER.

THE OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION (OSDBU) IS PLANNING A SERIES OF COMPREHENSIVE TRAINING SESSIONS FOR PROCUREMENT AND PROGRAM OFFICIALS AS WELL AS BUSINESS UTILIZATION AND DEVELOPMENT SPECIALISTS ON ALL ASPECTS OF ITS FOUR MAJOR BUSINESS AND ECONOMIC DEVELOPMENT PROGRAMS, NAMELY, THE SMALL BUSINESS, DISADVANTAGED BUSINESS, LABOR SURPLUS AREA, AND WOMEN-OWNED BUSINESS PROGRAMS. THE TRAINING SESSIONS ARE PRESENTLY SCHEDULED TO BE CONDUCTED IN DENVER, COLORADO, PORTLAND, OREGON, AND PHOENIX, ARIZONA DURING THE MONTH OF NOVEMBER.

INTERIOR RECENTLY INITIATED ACTION TO ESTABLISH AN INTERAGENCY AGREEMENT WITH THE SMALL BUSINESS ADMINISTRATION WHICH OUTLINES IN DETAIL THE VARIOUS WAYS IN WHICH INTERIOR CAN BETTER UTILIZE SBA'S EXISTING SMALL BUSINESS, DISADVANTAGED BUSINESS, AND WOMEN'S BUSINESS ENTERPRISE PROGRAM RESOURCES. THE PROPOSED AGREEMENT ALSO OUTLINES THE PARAMETERS WITHIN WHICH SBA WILL AGREE TO PROVIDE ADDITIONAL EXPERTISE AND SUPPORT TO INTERIOR'S RELATED PROGRAMS.

ONE ADDITIONAL AREA IN WHICH THE DEPARTMENT WILL FOCUS A HIGH DEGREE OF ATTENTION IN FY '82 IS IN THE AREA OF SUBCONTRACTING. THE DEPARTMENT STRONGLY BELIEVES THAT A LARGE NUMBER OF SMALL BUSINESSES HAVE NOT TAKEN FULL ADVANTAGE OF THOSE SUBCONTRACTING OPPORTUNITIES THAT EXIST WITHIN THE DEPARTMENT'S OVERALL PROCUREMENT PROGRAM. CONSEQUENTLY, A CONCERTED EFFORT WILL BE MADE BY OSDBU TO ASSIST INTERIOR'S CONTRACTING AND PROCUREMENT OFFICIALS IN THEIR REVIEW AND EVALUATION OF SUBCONTRACTING PLANS AS WELL AS THEIR EFFORTS TO OVERSEE AND MONITOR SUBCONTRACTING COMPLIANCE SO AS TO ENSURE THAT SMALL BUSINESSES AND SMALL DISADVANTAGED BUSINESSES ARE GIVEN MAXIMUM OPPORTUNITIES TO ACTIVELY PARTICIPATE IN THE DEPARTMENT'S SUBCONTRACTING PROGRAM.

ITEM (E): OTHER ACTIVITIES OF THE DEPARTMENT WHICH WOULD BE OF SOME INTEREST TO THE SMALL BUSINESS COMMUNITY

THE DEPARTMENT OF THE INTERIOR PLANS TO MAINTAIN ITS EXCELLENT RECORD OF PROVIDING OUTREACH AND ASSISTANCE TO THE SMALL BUSINESS

COMMUNITY ON A REGULAR AND CONTINUOUS BASIS. THE OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION IS COMMITTED TO ITS ANNUAL CONDUCT OF SPECIAL OUTREACH EFFORTS SUCH AS THE RECENT MINI-TRADE FAIR CONDUCTED IN MAY OF THIS YEAR IN OBSERVANCE OF SMALL BUSINESS WEEK. MEMBERS OF MY PROFESSIONAL STAFF AS WELL AS MYSELF MAKE IT A POINT TO REPRESENT THE DEPARTMENT AT EACH OF THE MAJOR CONFERENCES, SEMINARS, WORKSHOPS, SYMPOSIUMS, ETC., GIVEN ANNUALLY BY SMALL, SMALL DISADVANTAGED, AND WOMEN-OWNED BUSINESS TRADE ASSOCIATIONS. THE DEPARTMENT IS NOT JUST A SPECTATOR AT SUCH EVENTS BUT WE REGULARLY PURCHASE BOOTH SPACE AND PROVIDE A VARIETY OF USEFUL CONTRACTING INFORMATION AND HANDOUTS DETAILING SMALL BUSINESS PROCUREMENT OPPORTUNITIES WITHIN THE DEPARTMENT.

THE DEPARTMENT HAS ALSO ADOPTED THE SMALL BUSINESS ADMINISTRATION'S PROCUREMENT AUTOMATED SOURCE SYSTEM (PASS) AS ITS PRIMARY SOURCE FOR LOCATING AND IDENTIFYING SMALL BUSINESS SOURCES. THE DEPARTMENT'S U.S. GEOLOGICAL SURVEY AT THE DENVER FEDERAL CENTER, WHICH IS A MAJOR BUYING AREA WITHIN THE DEPARTMENT, HAS ACQUIRED ITS OWN PASS TERMINAL TO ASSIST INTERIOR CONTRACTING AND PROCUREMENT OFFICIALS IN THE DENVER AREA IN THEIR CONTINUING EFFORTS TO LOCATE AND IDENTIFY SMALL BUSINESS SOURCES.

MR. CHAIRMAN, I HAVE ATTEMPTED TO SUMMARIZE FOR YOU SOME OF THE STRONG AND AGGRESSIVE STEPS BEING TAKEN BY THE DEPARTMENT OF THE INTERIOR IN SUPPORT OF SMALL BUSINESS. WE, IN INTERIOR, FIRMLY BELIEVE THAT THE GENERAL HEALTH OF SMALL BUSINESS IS INEXTRICABLY TIED TO THE GENERAL HEALTH OF THE NATION'S ECONOMY. IT THEREFORE STANDS TO REASON THAT WHEN WE TEND TO THE NEEDS OF SMALL BUSINESS IN THIS COUNTRY, WE BUILD A MORE VITAL ECONOMIC FABRIC WHICH, IN THE LONG RUN, BENEFITS THE FEDERAL GOVERNMENT AS A BUYER, THE INDIVIDUAL CONSUMER, AND THE HUNDREDS OF "BIG" BUSINESSES THAT RELY ON SMALL BUSINESS TO SUPPLY THE COGS WHICH KEEP THE WHEELS OF THEIR LARGE ORGANIZATIONS MOVING. THANK YOU.

Enclosure III

Additional Resources Required to Implement H.R. 4326 and S. 881

H.R. 4326

Since the Department of the Interior's Research and Development programs are decentralized, and since the R&D planning and budget processes vary among the bureaus, additional resources would be required to initiate and to implement the SBIR program. These resources would have to be absorbed within existing budget constraints.

Task	Personnel	Additional Time	Budget Amt.
1. Establish an SBIR	1*	1200 hrs.	$13,500
2. Identify Small Business R&D Set-Asides Annually		300 hrs.	$ 4,500
3. Coordinate Scheduling of Solicitations with SBA		110 hrs.	$ 1,010
4. Monitor the SBIR		410 hrs.	$ 5,750
5. Report to SBA and to the Office of Science and Technology Annually		230 hrs.	$ 3,450
	1*	2250 hrs.	$28,210

This projection is based on limited available information. A detailed analysis and verification of this information by our bureaus and offices, especially for Federal assistance activities, would be necessary upon enactment of H.R. 4326.

One person at the GS 13/14 level would act part-time as the SBIR Coordinator for the Department. After the first two year's implementation of the program, about 1/2 a person year would be needed to coordinate the program.

Enclosure III

Detail of H.R. 4326 Impact

Task	Personnel	Additional Time	Budget Amt.
1. Establish an SBIR			
a. Organize, plan and schedule implementation with pertinent Department bureau/office R&D managers, budget, procurement and Federal assistance personnel.	1*	580 hrs.	$6,700
b. Department coordinates with SBA, OFPP, and Office of Science and Technology.		20 hrs.	$ 300
c. Each bureau/office inventories and analyzes the type, mix, recipient and amount of research and development which are appropriate for set aside.		300 hrs.	$2,000
d. Department and bureau/office restructure program planning and solicitation process.		100 hrs.	$1,500
e. Department develops policy and bureaus comment/contribute (DM, proc., fed. assistance).		200 hrs.	$3,000
	1*	1200 hrs.	$13,500
2. Identify Mandatory Small Business R&D set asides Annually			
a. Bureaus and Offices R&D, procurement, Federal assistance budget managers coordinate on identifying specific projects.		200 hrs.	$3,000
b. Department consolidates set asides to ensure that Department meets mandatory %.		100 hrs.	$1,500
		300 hrs.	$4,500

*One person part-time

Enclosure III

Task	Personnel	Additional Time	Budget Amt.
3. Coordinate Scheduling of Solicitations with SBA			
a. Department submits annual schedule information (estimated) for planning purposes which was included in data compiled under 2a.		30 hrs.	$ 450
b. Each bureau/office activity submits copy of actual solicitation to SBA.		80 hrs.	$ 560
		110 hrs.	$1,010
4. Monitor the SBIR			
a. Each bureau/office and department assesses quarterly award accomplishments and adjusts performance accordingly.		400 hrs.	$ 2,800
b. Department reviews and consolidates results, evaluates problems and provides assistance.		10 hrs.	$ 2,950
		410 hrs.	$ 5,750
5. Report to SBA and to the Office of Science and Technology Annually			
a. Each bureau/office compiles and analyzes quantitative and qualitative results.		200 hrs.	$ 3,000
b. Department consolidates, verifies and prepares report.		30 hrs.	450
		230 hrs.	$ 3,450

Enclosure III

S. 881

The following additional resources would be required to implement Section 3(c)(1)(A) of S. 881. These resources would have to be absorbed within existing budget constraints.

Task	Personnel	Additional Time	Budget Amt.
1. Department and bureaus/ offices develop policy and procedures to emphasize SBIR and to require the development of annual small business R&D award goals.		300 hrs.	$5,000
2. Department and bureaus/ offices restructure program planning and solicitation process.		100 hrs.	$1,500
3. Department and bureaus/ offices develop and negotiate annual small business R&D goals.		150 hrs.	$2,500
4. Department and bureaus/ offices monitor quarterly accomplishments.		200 hrs.	$1,400
5. Report to SBA and to the Office of Science and Technology		200 hrs.	$1,750
		950 hrs.	$12,150

This projection is based on available information. A detailed analysis and verification of this information by our bureaus and offices, especially for Federal assistance programs, would be necessary upon enactment of S. 881.

Enclosure IV

Impact of H.R. 4326 and S. 881 on Implementation of Existing Small Business Programs

Either bill would provide the added impetus needed to encourage program, procurement and Federal assistance personnel to seek out and to award R&D projects to small businesses. Hopefully, in practice, the innovative research results would be emphasized, rather than the goal process or set aside activities, which are only the means to the end.

If H.R. 4326 were enacted, and if no additional resources were appropriated, there is a significant possibility that Interior's small business program would be fragmented. Although we are currently emphasizing small business R&D awards, the mandatory 3% set-aside requirement, and the limited prescribed method of procurement, would require a major shift from time now devoted to other small business programs. This impact would continue beyond the initiation of the program.

If S. 881 were enacted without additional resources, some fragmentation in the emphasis on the small business program would also occur in the first year due to the effort required to develop goals. The effort required to ensure that bureaus achieved at least the same percentage of prior year expenditures would not significantly impact other small business programs.

U.S. Department of Transportation

Office of the Secretary
of Transportation

400 Seventh St., S.W.
Washington, D.C. 20590

JAN 27 1982

RECEIVED
JAN 29 1982
COMMITTEE ON SCIENCE
AND TECHNOLOGY

The Honorable Don Fuqua
Chairman, Committee on Science and
Technology
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your request for the views of the Department of Transportation concerning H.R. 4326, a bill

> "To amend the Small Business Act to strengthen the role of the small, innovative firms in federally funded research and development, and to utilize Federal research and development as a base for technological innovation."

The Department of Transportation (DOT) endorses the purpose of the bill and S. 881 which is to stimulate the technologically and innovatively oriented small business sector. The bills will have a positive impact on the vitality of small businesses as a major source of innovation, by enhancing their utilization in the Federal research and development (R&D) activities, and providing a means by which they can participate more readily in the R&D areas. Further, these bills recognize that technological innovation, utilizing the small business sector, contributes to job creation, increased productivity and economic growth of the Nation.

One of our major concerns is that H.R. 4326 is too expansive in its mandate to include all Federal agencies with R&D budgets. Rather, we believe that participation should be limited as set out in S.881.

In response to the information you requested regarding the impact of the Act on the Department's current practices, we submit the following comments:

1) The Department of Transportation complies with the requirements of Public Law 95-507 and the requirements of the Small Business Act as set forth in the regulations of the Small Business Administration and the Federal Procurement Regulations;

2) There will be some additional costs necessary to implement the SBI program, including the establishment of a program office and staffing to provide technical and procurement assistance , and to monitor contracts selected for the program. These additional costs have not been assessed at this time; and,

3) The DOT plans to comply with any new regulations set by the Small Business Innovative Program. A portion of the DOT R&D funds will be set aside only for small businesses who are participants in the Small Business Innovative Program in accordance with the new regulations, similar to the other compliance actions taken by the Department.

The Office of Management and Budget has advised that, from the standpoint of the Administration's program, there is no objection to the submission of this report for the consideration of the Congress.

Sincerely,

John M. Fowler

John M. Fowler
General Counsel

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 30 1982

OFFICE OF
THE ADMINISTRATOR

Honorable Don Fuqua
Chairman, Committee on
Science and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Thank you for your letter requesting the views of the Environmental Protection Agency on H.R. 4326, the "Small Business Innovation Research Act of 1981," and its Senate counterpart, S. 881.

If enacted, H.R. 4326 and S. 881 would both require that Federal agencies whose research and development budgets exceed specified levels establish a Small Business Innovation Research Program (SBIR) and allocate a fixed percentage of agency research and development funds to the program.

We support the goals which would be achieved through enactment of these bills, and have implemented our programs to assist small businesses. However, from the standpoint of the President's program, we endorse the Senate bill (as passed), which would apply a formula to determine which agencies must establish an SBIR Program and allocate one percent of their research and development funds to the program. We also recommend the Senate approach, which would require that agencies whose research and development budgets exceed $100 million annually establish percentage goals for funding agreements for research and development with small businesses. Attachment I outlines our analysis of the major provisions in the House and Senate legislation.

Directives issued by the Office of Management and Budget (OMB) in March 1977 and September 1978 require Federal agencies to increase small business research and development procurement. Although EPA does not undertake a substantial number of these kinds of research and development projects, in 1981 thirty-two percent of the Agency's total research and development contracts were awarded to small businesses. Attachment II outlines the procedural initiatives we have introduced to assist small businesses.

EPA is also committed to minimizing adverse economic impacts of regulations on small businesses. Our efforts include adopting flexible alternatives, identifying regulations of concern in EPA's semiannual Regulatory Agenda, operating toll-free information lines for specific programs, and providing help in obtaining financial assistance for pollution control equipment. Attachment III contains a detailed description of our measures to reduce unreasonable regulatory burdens on small businesses.

As you requested, I have enclosed a copy of EPA's previous correspondence with the Congressional Budget Office concerning S. 881 (as introduced).

In closing, I want to emphasize that EPA will continue to promote the economic health and vitality of small businesses by providing opportunities for them to participate in all phases of Agency procurement undertakings. If you have any further questions, please do not hesitate to contact me.

The Office of Management and Budget has advised us that there would be no objection to the submission of this report from the standpoint of the President's program.

Thank you for the opportunity to comment on this legislation.

Sincerely yours,

John W. Hernandez

John W. Hernandez, Jr.
Deputy Administrator

Enclosures

ATTACHMENT I

ANALYSIS OF H.R. 4326 AND S. 881

We have reviewed the specific requirements of each bill and offer the following comments:

1. Net Cost Projection: It is difficult to project net cost figures for implementation of H.R. 4326 and S. 881. It is even more difficult to project cost figures without knowing what policy directives or regulations the lead agency will issue. EPA currently has several set-aside programs (e.g., small business, 8a, disadvantaged business, etc.) and goals for contract awards. Therefore, we would track compliance with the Small Business Innovation Research Program (SBIR) established by this legislation through the same system.

2. SBIR Program Set-Aside Formula: The Senate and House bills use different formulas to determine which agencies are required to establish and fund an SBIR Program.

   We support the Senate version which results in a one-percent set-aside for certain agencies, and increases the research allocation for small business over three years to an estimated $400 million annually. We also prefer the Senate provision which would require agencies whose research and development budgets exceed $100 million annually, to establish percentage goals for funding agreements for research and development with small businesses.

3. SBIR Program Policy Directives: H.R. 4326 authorizes the Small Business Administration (SBA) to issue policy directives for the conduct of the SBIR Program which would provide a simplified, standardized and timely process for solicitations and funding. The Office of Federal Procurement Policy (OFPP) is already working towards a unified Federal procurement system which will achieve these goals. Since many of the SBIR Program directives will be procurement related, the goal of a unified system would be best served by following the Senate approach which assigns OFPP lead responsibility for issuing these directives.

   The House bill further requires that the policy directives to be issued by the SBA include a provision for cost-sharing. Is this meant to be mandatory for all awards under the SBIR Program? This would put small businesses which participate in this program at a disadvantage. While cost sharing is common with grants and cooperative agreements, it is uncommon in procurements where businesses normally earn a profit rather than being forced to share costs with agencies.

   We would like to point out that although H.R. 4326 requires SBA to issue policy directives, reference is made throughout the bill to "regulations".

ATTACHMENT II

EPA INITIATIVES ON BEHALF OF SMALL BUSINESSES

1. Record of Procurement Request Review Report: In expanding the small business program at EPA and in order to meet the commitment to the program, EPA has developed and implemented a screening method for all procurement requests in excess of $10,000. The use of this procedure is to assure that a fair proportion of the Agency's requirements are set-aside for small business concerns.

2. Small Business Set-Aside Targets: EPA establishes small business set-aside targets on an annual fiscal year basis. Progress achieved against the targets is monitored on a monthly basis.

3. Development and Coordination of EPA's Small Business Activity: The EPA Office of Small and Disadvantaged Business Utilization (OSDBU) is charged with the responsibility for ensuring that a fair proportion of the Agency's procurements, regardless of dollar value are reviewed for set-aside consideration by Agency managers. OSDBU is further charged with the responsibility for directing the attention of the Agency's key program and contractor personnel to those small businesses with capabilities particularly relevant to the procurement needs of the Agency. OSDBU also works very closely with the Small Business Administration to identify prospective small business contractors for EPA's procurement awards, including research and development contracts, as available.

4. Enhance Procurement Awards to Small Business:

    a. Information Exchange: EPA's OSDBU Program Officers conduct seminars on a continuing basis to inform technical and contracting personnel about the various opportunities that are available to utilize small businesses in procurement programs at EPA. The workshops' principal discussions are focused on operating procedures, Executive Orders and applicable laws directed at increasing the level of Agency contracting with small businesses, as well as on EPA procedures relating to small business set-aside practices.

b. Business Opportunity/Federal Procurement Conferences National Science Foundation: EPA's policy is to continue to promote and further the economic development and vitality of small businesses by participating in Federal procurement conferences scheduled by various Members of Congress in their home districts. Representatives of EPA's Procurement and Contracts Management Division and Office of Small and Disadvantaged Business Utilization actively participate in these conferences to educate candidate small businesses with respect to EPA's contracting methods and practices. In addition, the EPA actively participates in conferences sponsored by the National Science Foundation directed at assisting eligible small businesses to become recipients of EPA's technical procurement contracts.

5. Pamphlets, Publications and Reference Materials: EPA has developed materials for use by the Agency's technical and contracting personnel directed at maximizing small business utilization in all aspects of our procurement program. The publications describe the overall Federal small business program with major emphasis on the EPA's small business program, policies, and procedures.

6. Procurement Automated Source System (PASS): EPA utilizes the Procurement Automated Source System (PASS), established by the Small Business Administration, to identify small businesses for contracting opportunities. The PASS permits small and disadvantaged firms, which are registered with the system, to match their capabilities to specific source requests by government agencies or private contractors. All three of EPA's major acquisition centers - Washington, Cincinnati, and Durham - are utilizing this system.

7. Small Business Ombudsman: In January, 1981 EPA appointed its Small Business Ombudsman, Mr. Marc Jones of the Office of Policy Analysis. The Ombudsman will assist small businesses experiencing regulatory difficulties, and will provide another mechanism for response to their interests and needs.

ATTACHMENT III

STATEMENT OF
JOSEPH A. CANNON
ACTING ASSOCIATE ADMINISTRATOR
FOR POLICY AND RESOURCE MANAGEMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON EXPORT OPPORTUNITIES
AND SPECIAL SMALL BUSINESS PROBLEMS
OF THE
COMMITTEE ON SMALL BUSINESS
U.S. HOUSE OF REPRESENTATIVES

OCTOBER 20, 1981

Good morning Mr. Chairman and members of the Subcommittee. I am Joseph A. Cannon, Acting Associate Administrator for Policy and Resource Management of the Environmental Protection Agency. I am pleased to appear before you today to discuss the Agency's progress in implementing P.L. 96-354, the Regulatory Flexibility Act.

Background

The Regulatory Flexibility Act requires that Federal agencies analyze the effects of new and existing regulations that have a significant economic impact on "small entities." As defined in the Act, small entities include small businesses, local governments, and small organizations.

The Act mandates that each Federal agency periodically review existing regulations and publish in the Federal Register a plan of review for those regulations with a significant economic impact on small entities. The review determines whether an existing regulation should be left unchanged, amended or rescinded to minimize economic impacts on small entities. The Act requires that each agency annually publish in the Federal Register a list of the rules to be reviewed in the coming year. The list must describe each rule, its need, its legal basis, and invite public comment.

Each regulation with significant impact on small entities must be reviewed at least once every ten years.

New regulations proposed after January 1, 1981 must have a Regulatory Flexibility Analysis (RFA) or certification that the regulation as promulgated will not have a significant economic impact on large numbers of small entities. Agencies must also issue a Regulatory Agenda listing rules being developed which may have such an economic effect.

I would now like to discuss EPA's implementation of the Regulatory Flexibility Act.

Overview of Compliance with the Act

The Environmental Protection Agency is committed to minimizing significant economic impacts on small entities. In early 1981, EPA established an Agency Workgroup to plan for implementation of the Regulatory Flexibility Act, including a set of internal guidelines. These internal guidelines are currently under extensive review by the EPA Steering Committee, composed of representatives of top Agency officials.

EPA's Plan for Periodic Review of Existing Regulations was published July 16, 1981. In December 1980, the Agency appointed its Regulatory Flexibility officer, Mr. Daniel Fiorino of the Office of Standards and Regulations, who is also our official liaison with the Small Business Administration (SBA). He is responsible for implementation of the Regulatory Flexibility Act, including coordinating review of regulations for economic impact, coordination of Steering Committee and Workgroup activities, and ensuring Agency compliance with the Act.

Starting this month, EPA will list in the Federal Register regulations to be reviewed during the next twelve months in a special section of our Regulatory Agenda. We will ask for public comment on each regulation listed. Our last Agenda was published April 27, 1981.

The Mechanics of Regulatory Flexibility

To date, EPA has proposed one regulation which required a Regulatory Flexibility Analysis (RFA). The rule proposed effluent standards and limitations for the porcelain enameling industry. Many other RFAs are in process, including: an exemption for small manufacturers from the reporting requirements of section 8 of the Toxic Substances Control Act; several effluent guidelines under the Clean Water Act; revisions of drinking water regulations; and listings of hazardous waste and permit standards under the Resource Conservation and Recovery Act. Our next Agenda will list each regulation under development that may require an RFA.

In establishing minimum requirements for deciding whether a Regulatory Flexibility Analysis is necessary, EPA programs must first define "small entity." For this purpose, the lead office may either: 1) use the definitions of "small entity" in the Act, or 2) develop its own definitions by consulting with the SBA and allowing public comments.

After defining "small entity," the Agency must determine whether the regulation will have a "significant impact" on a "substantial number of small entities." We make this determination on a case-by-case basis using the criteria discussed below.

In general, a "substantial number" of small entities is more than 20%, but the 20% rule is not fixed. There may be cases where the intent of the Act indicates the need for an RFA when less than 20% of small entities are affected. For example, some regulations could impose such severe economic hardship on a few business that the RFA would be necessary, even though the total number affected might be small.

To determine a "significant economic impact" the lead office considers annual costs, capital costs, and potential plant closures.

The third aspect of EPA's compliance with the Act is reporting information on small entities in the Regulatory Agenda. Our Agenda deals with this in two ways:

1. In the section of our Regulatory Agenda where EPA gives small entities general notice of regulations that may affect them, we add one of the following three determinations:
    - Likely -- (to have a significant impact)
    - Unlikely -- (to have a significant impact)
    - Not yet determined
2. If EPA is certain that an RFA will be prepared, we add "RFA" to the section of our Regulatory Agenda which outlines the kinds of analyses a regulation requires.

After reviewing the economic and substantial number criteria, the lead office may conclude that an RFA is unnecessary. In that case the Administrator will certify at the time of publication of the proposed or final rule that the rule will not have such an adverse impact. Such a certification must contain a succinct statement of the reasoning and criteria used to make the determination.

One problem EPA has encountered with the Act is interpreting whether it applies to regulations that have a significant *beneficial* impact. Such an application could be justified by the legislative history of the Act, but this interpretation may interfere with the goal of the Act, which is to reduce unreasonable burdens. EPA amends many existing regulations to reduce regulatory burdens, such as reporting requirements. Preparing an RFA for these regulations would be costly, as well as delay the regulations that small entities may want.

EPA believes that the best way to deal with this issue is on a case-by-case basis. To require RFAs for *all* regulations that have a significant *beneficial* impact will delay many regulations, including those for which an RFA would not be fruitful.

The Regulatory Flexibility Analysis (RFA)

The RFA summarizes the economic impact of a regulation on small entities and discusses alternatives that might minimize the impact and still accomplish the statutory objectives. The most sophisticated RFA would contain the following elements:

1. Explanation of Why EPA is Considering Action
2. Objectives and Legal Basis of the Rule
3. Identification of Alternatives
4. Demographic Analysis
5. Cost Analysis
6. Competitive Effects Analysis
7. Exemptions or Allowances
8. Identification of Overlapping Regulations
9. Summary of Public Comments

In order to comply with the Act's requirement to coordinate its implementation with SBA, the Office of Standards and Regulations transmits copies of certifications and RFAs to SBA.

One of the major goals of the Act is to encourage agencies to "tier" their regulations, that is, to exempt or to set less stringent requirements for small entities. EPA has issued more than 40 regulations that have less stringent requirements for small businesses. For example, we have exempted "small generators" from regulations under the Resource Conservation and Recovery Act. In addition, our New Source Performance Standards Program under the Clean Air Act and our Effluent Guidelines under the Clean Water Act include many examples of tiering.

EPA also tries to make exemptions consistent across various programs affecting the same industry, when it is appropriate to do so. Industrial Assistance Staff in our Office of Policy Analysis monitors the process to identify inconsistent exemptions. As a further aid, the Regulation Management Staff in the Office of Standards and Regulations will maintain a catalogue of exemptions based on certifications, previously prepared RFAs, and exemption information included in the Agenda.

Since public participation has always played a key role in the EPA rulemaking process, small business and other small entities may comment on any rules that significantly affect them. Lead offices satisfy this requirement of the Act by taking special measures to involve small entities in regulations that affect them.

Both our Solid Waste and Toxic Substances Programs have special hotlines to respond to questions and problems of small businesses. Finally, we are considering appointing a Small Business Ombudsman in the Office of Policy Analysis to assist small businesses experiencing regulatory difficulties.

Plan for Periodic Review of Existing Regulations

The Act requires that EPA screen its existing regulations to identify those that may have a significant economic impact on a substantial number of small entities. On July 16, 1981, EPA published in the Federal Register our Plan For Periodic Review of Existing Regulations. In deciding whether a regulation imposes significant impacts we look at such factors as high annualized costs for pollution control, the extent of reporting or recordkeeping burden, the relationship of pollution control costs to sales, and the anti-competitive effects of a regulation on small businesses. We are in the process of reviewing public comments received in response to the Notice.

In the October 1981 Agenda EPA will announce seven regulations for review under the Act. They are:

- New Source Performance Standards for Grain Mills under Section 111 of the Clean Air Act;
- General Pretreatment Regulations under the Clean Water Act;
- Lead Phasedown Review under section 211 of the Clean Air Act;
- EPA's Public Participation Policy

- General Requirements for Storage Facilities under section 3004 of the Resource Conservation and Recovery Act (RCRA)
- Incinerator Standards under RCRA 3004
- Financial Responsibility regulations under RCRA 3004

In addition, revisions of existing EPA regulations that have significant impacts on small entities are already underway in the drinking water and other programs. We are also reviewing paperwork burdens in the RCRA Program.

The mechanics of EPA's periodic review are as follows:

o Starting in October 1981, EPA will list regulations to be reviewed during the succeeding 12 months under the Regulatory Flexibility Act in a special section in its Regulatory Agenda and will ask for public comment on the need to revise each regulation listed.

o After considering public comments and other available data, the Agency will announce the result of its review either in the subsequent April Agenda or, if more review time is necessary, in the next October Agenda. The decision in each case will announce either no change in the regulation, a revision, or a rescission. EPA will explain the basis of its decision.

o EPA will decide to revise a regulation if (1) the existing burdens on small entities are unreasonable, or (2) there are alternatives that should be considered because they may minimize impacts on small entities.

We may amend our plan for review of regulations under the Regulatory Flexibility Act after we develop procedures for reviewing additional regulations under other regulatory reform statutes and Executive Order 12291.

Conclusion

In closing, I would like to emphasize that EPA will continue its efforts to minimize the regulatory burden on small entities. The Small Business Ombudsman, when appointed, will further assist small businesses with their specific problems and will provide another mechanism for response to their interests and needs. Moreover, we anticipate that our implementation of the Regulatory Flexibility Act will aid in promulgating cost-effective regulations.

As requested, Mr. Chairman, I am providing materials for the record which include my prepared statement, a copy of our ten-year periodic review plan, an example of an initial RFA, and a copy of our April Agenda. We will forward a copy of our October Agenda to the Committee as soon as it is published.

This concludes my prepared remarks. I would be happy to respond to any questions you may have.

ATTACHMENT IV

3 0 OCT 1981

Mr. James L. Blum
Assistant Director for
Budget Analysis
Congressional Budget Office
House of Representatives
Washington, D.C. 20515

Dear Mr. Blum:

Thank you for your letter requesting a preliminary net cost estimate for implementing S. 881, the "Small Business Innovation Research Act of 1981."

If enacted, S. 881 would require that Federal agencies whose research and development budget exceeds $100 million annually establish a Small Business Innovation Research Program (SBIR), and allocate a fixed percentage of agency research and development funds to the program.

We support in principle S. 881 and have tried to implement our programs to assist small businesses. However, from the standpoint of programs administered by EPA, we question its necessity, and we are concerned that its implementation will create additional processing burdens which impede timely and efficient functioning. In addition, we feel that the bill is duplicative of actions already undertaken at EPA on behalf of small businesses.

- Directives issued by the Office of Management and Budget in March 1977 and September 1978 require Federal agencies to increase small business research and development procurement. EPA generates a minimum number of the type of research and development procurements which are defined in both the directives and S. 881. Although EPA does not undertake a substantial number of these kinds of research and development projects, you should know that in FY 1980 thirty-one percent of the Agency's total research and development contracts were awarded to small businesses. Attachment I outlines the procedural initiatives we have introduced in EPA's overall procurement programs to assist small businesses.

It is difficult to project concrete net cost figures for implementation of S. 881. EPA currently has several set-aside programs (i.e., minority, small business, disadvantaged, etc.) and goals for contract awards. Therefore, we would track compliance with the Small Business Innovation Research Program (SBIR), established by S. 881, through the same system. Additional time is required for review of each contract to determine whether a procurement is appropriate for any set-aside program.

In all likelihood, there will not be substantial, additional administrative costs for implementing the SBIR Program and monitoring contract compliance. The costs are real, however, they would be absorbed in the costs of meeting EPA's other contracting goals. Also, since EPA already complies with contracting reporting requirements, the additional (but duplicative) requirements in S. 881 could be implemented at small cost.

There is a significant and immeasurable cost associated with any set-aside program: the increase in procurement costs due to lack of competition. The Agency has no way of knowing how much less a given product or service might have cost.

S. 881 would require that Federal agencies establish contracting goals for grants and cooperative agreements, as well. Since there have never been set-asides in the assistance research programs, there would be some new and small costs to institute a parallel tracking and monitoring system for grants and cooperative agreements. In addition, there are some problems with set-asides in these areas.

By law, grants and cooperative agreements are targeted for non-profit institutions and state and local governments. Profit-making groups are ineligible. Therefore, the issues are (1) how to create a set-aside when there is no solicitation for procurement, and (2) ineligibility of profit-making groups.

EPA's procurement system (and to a smaller extent, the grants system) is overburdened with hundreds of specific requirements, each of which is designed to accomplish a specific goal. When taken together, these requirements create red tape and enormous processing burdens which impede timely and efficient functioning.

In closing, I want to emphasize that EPA will continue to promote the economic health and vitality of small businesses by providing opportunities for them to participate in all phases of Agency procurement undertakings. If you have any further questions, please contact me.

Sincerely yours,

/s/
Jack Woolley
Director
Office of Congressional Liaison

Enclosure

A-102:DFerris:hjm:10/28/81:Rm. W-843:x51320
cc: ALL - Reading File Copy
ALL - Yellow File Copy
Chron. File Copy

AL - 4226 (blue 9-11-81)

ATTACHMENT I

EPA INITIATIVES ON BEHALF OF SMALL BUSINESSES

1. Record of Procurement Request Review Report: In expanding the small business program at EPA and in order to meet the commitment to the program, EPA has developed and implemented a screening method for all procurement requests in excess of $10,000. The use of this procedure is to assure that a fair proportion of the Agency's requirements are set-aside for small business concerns.

2. Small Business Set-Aside Targets: EPA establishes small business set-aside targets on an annual fiscal year basis. Progress achieved against the targets is monitored on a monthly basis.

3. Development and Coordination of EPA's Small Business Activity: The EPA Office of Small and Disadvantaged Business Utilization (OSDBU) is charged with the responsibility for ensuring that a fair proportion of the Agency's procurements, regardless of dollar value are reviewed for set-aside consideration by Agency managers. OSDBU is further charged with the responsibility for directing the attention of the Agency's key program and contractor personnel to those small businesses with capabilities particularly relevant to the procurement needs of the Agency. OSDBU also works very closely with the Small Business Administration to identify prospective small business contractors for EPA's procurement awards, including research and development contracts, as available.

4. Enhance Procurement Awards to Small Business:

   a. Information Exchange: EPA's OSDBU Program Officers conduct seminars on a continuing basis to inform technical and contracting personnel about the various opportunities that are available to utilize small businesses in procurement programs at EPA. The workshops' principal discussions are focused on operating procedures, Executive Orders and applicable laws directed at increasing the level of Agency contracting with small businesses, as well as on EPA procedures relating to small business set-aside practices.

b. Business Opportunity/Federal Procurement Conferences National Science Foundation: EPA's policy is to continue to promote and further the economic development and vitality of small businesses by participating in Federal procurement conferences scheduled by various Members of Congress in their home districts. Representatives of EPA's Procurement and Contracts Management Division and Office of Small and Disadvantaged Business Utilization actively participate in these conferences to educate candidate small businesses with respect to EPA's contracting methods and practices. In addition, the EPA actively participates in conferences sponsored by the National Science Foundation directed at assisting eligible small businesses to become recipients of EPA's technical procurement contracts.

5. Pamphlets, Publications and Reference Materials: EPA has developed materials for use by the Agency's technical and contracting personnel directed at maximizing small business utilization in all aspects of our procurement program. The publications describe the overall Federal small business program with major emphasis on the EPA's small business program, policies, and procedures.

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

19 FEB 1982

THE ADMINISTRATOR

Dear Chairman Fuqua:

We are pleased to respond to your request for comments on H.R. 4326, a bill to amend the Small Business Act to strengthen the role of small, innovative firms in federally funded research and development.

The Agency for International Development spent an estimated $136,000,000 on research and development in fiscal year 1981. However, most of these funds were not set aside specifically for research and development. Approximately $70 million was programmed by the Agency's Science and Technology Bureau. Of this amount, $40 million was for general institutional support of thirteen International Agricultural Research Centers; $4 million was for general program support for the Tropical Disease Research Institute run by the World Bank; $1.9 million was for general institutional support of the International Diarrheal Disease Research Center in Bangladesh; $4 million was for general institutional support of the International Fertilizer Development Center in Alabama; and $20 million was used to support university research in such areas as malaria vaccine and soybeans.

The remaining funds were channeled through various A.I.D. programs. Most also went to support research being done in U.S. universities or international research centers. Some of the remaining funds went for research components of larger A.I.D. projects. For example, seed research may have been a part of a larger agriculture research and extension project. A small portion of the total funds -- approximately 3-6% -- was used to contract with private consulting firms.

Although we support the intention of H.R. 4326, we prefer S. 881 and oppose H.R. 4326 on the following grounds:

The Honorable Don Fuqua
Chairman
Committee on Science and Technology
U.S. House of Representatives
Washington, D. C. 20515

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COMMITTEE ON SCIENCE
AND TECHNOLOGY

First, as described above, approximately $50 million of A.I.D.'s research and development budget is solely for general institutional support of international research centers. These funds by their nature are not amenable to a small business set aside. The House bill, however, would not seem to exclude this type of R & D in determining an agency's R & D budget for purposes of application of the set-aside requirements.

Another concern of this Agency is that in some cases, A.I.D. funds are spent on R & D through host country contracts pursuant to a grant to the recipient country. These contracts are controlled by the recipient government and therefore are not amenable to U.S. Government set-aside requirements. We would prefer that host country contracts be excluded when determining an agency's R & D budget under the legislation.

To assist the Committee in evaluating the impact of the proposed legislation, you asked that we prepare: (1) a description of A.I.D.'s existing practices for complying with all applicable statutes relating to small business; (2) a statement of the additional time, personnel, and other budgetary amounts required to implement both H.R. 4326 and S. 881; and a discussion of how A.I.D.'s practices would have to be modified to carry out the provisions of H.R. 4326 or S. 881. The following paragraphs contain the requested information.

(1) A.I.D.'s Office of Small and Disadvantaged Business Utilization is responsible for working with all Agency bureaus and offices to fulfill the Agency's obligations regarding small business, including counseling and set-asides. A.I.D. Procurement Regulations sections 7-1.704-6 set forth the small business screening procedure for A.I.D. All proposed contract actions are screened utilizing AID Form 1410-14, a copy of the Project Implementation Order/Technical Service, and relevant correspondence on the procurement to determine whether the contract should be set-aside for small businesses. The requirements of the contract are compared manually to an index of small businesses. The screening process is normally completed within five working days. At the end of each year, data on the number of small businesses utilized by A.I.D. is retrieved through an automated system and reviewed. The Small Business Administration monitors the entire process.

(2) H.R. 4326 would require A.I.D. to develop and maintain a source file and information program. A.I.D. could comply with this requirement by compiling brief descriptions of R & D projects and distributing the information to potentially interested small businesses through our Office of Small and Disadvantaged Business Utilization. This process would require

coordination between the A.I.D. project offices and the Small Business Office and would also require the addition of one full-time clerical position. The data for reporting on this program could be retrieved through A.I.D.'s present automated system after necessary reprogramming.

(3) The Agency presently reviews all direct A.I.D. contracts for the possibility of small business set-asides. However, most of what could be termed the Agency's "R & D budget" is not spent through direct A.I.D. contracts and would therefore not fall within the current procedures. Additionally, the Agency does not have a separate R & D budget. Under the requirements of these bills, the Agency would have to review its program and try to isolate those projects or parts of projects which could be termed R & D. To a large extent, this would have to be the responsibility of the project offices since research is often one component of a larger project. These projects would then be reviewed for the possibility of a small business set-aside and information distributed to relevant firms. A.I.D.'s data retrieval system would have to be programmed to give information on the Agency's progress in meeting its goals.

Research and development projects are included within the Agency's present goals for small business set-asides. Because of the considerations discussed above, however, we oppose the enactment of H.R. 4326. The Office of Management and Budget has reviewed this response and has no objection to it.

When asked to comment on this bill last year, A.I.D. concurred in the response of the Department of Defense but did not send separate comments.

Sincerely,

M. Peter McPherson

NASA

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: HP-1

JAN [illegible] 1982

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JAN [illegible] 1982
COMMITTEE ON SCIENCE
AND TECHNOLOGY

Honorable Don Fuqua
Chairman
Committee on Science and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This responds to your letter of November 30, 1981, requesting NASA's views and comments on H.R. 4326, the Small Business Innovation Development Act, as reported by the House Committee on Small Business in November 1981. In addition thereto, you requested that, in commenting, we distinguish our views between the House version (H.R. 4326) and the Senate counterpart (S. 881) which was passed by the Senate on December 8, 1981.

Before we comply with your request, NASA, as in the past, endorses the objectives of these two bills and we support passage of S. 881. However, we are opposed to certain provisions in H.R. 4326 designed to achieve those objectives.

To date, NASA has testified before Committees of the Congress on six occasions on the matter of small business innovation and/or upon the bills presently before the 97th Congress:

> November 1, 1979 - Committees on Science and Technology and Small Business, U.S. House of Representatives, and the Select Committee on Small Business, U.S. Senate
>
> April 1, 1980 - Committee on Small Business, U.S. House of Representatives
>
> June 12, 1980 - Subcommittee on Investigations and Oversight and Subcommittee on Science Research and Technology, Committee on Science and Technology, U.S. House of Representatives
>
> July 15, 1981 - Subcommittee on Innovation and Technology, Committee on Small Business, U.S. Senate
>
> September 15, 1981 - Subcommittee on General Oversight, Committee on Small Business, U.S. House of Representatives

September 22, 1981 - Subcommittee on Export Opportunities and Special Small Business Problems, Committee on Small Business, U.S. House of Representatives

Copies of the testimony given upon those occasions are enclosed.*

Under the Small Business Act of 1953, as amended, NASA has pursued an aggressive and growing small business program since establishment of the Agency in 1958. Regulations for the conduct of this program are set forth in Part 1, Subpart 7, of the NASA Procurement Regulation, a copy of which is also enclosed. The small business program is conducted through the procurement process at each Center under the policies of the Administrator carried out through the functional management of the Agency Director of Procurement and the Director of Small and Disadvantaged Business Utilization. A complementary and equally significant small business program is conducted by the Director of Technology Transfer through the transfer and application of the technology which emanates from NASA primary research and development work to enhance the quality of life and economic well being of the Nation. A detailed description of these processes and their results is set forth in the enclosed NASA testimony of September 22, 1981, before the House Subcommittee on Export Opportunities and Special Small Business Problems and the FY 1981 NASA Small Business Report.

You have further requested a statement of the budgetary and manpower impact on NASA of carrying out the provisions of H.R. 4326 and S. 881 together with a discussion of how present practices would require modification were either bill to be enacted.

Prior to commenting upon these impacts, a brief comparison of the major features of the two bills will place the dissimilar effects of them in perspective.

H.R. 4326 would amend Section 9 of the Small Business Act to require, among other things, that any agency with a research or research and development (R&D) budget in excess of $100,000,000 beginning in fiscal year (FY) 1982, establish a Small Business Innovation Research (SBIR) program with specific percentages of its R&D budget being expended under the program: in the first FY, 0.5 percent; in the second FY, 1 percent; in the third FY, 2 percent; and in all subsequent years, 3 percent. In addition to the above, the bill also would require all agencies with R&D budgets in excess of $20 million for any FY beginning with 1982 and thereafter to unilaterally establish goals for funding agreements with small businesses, and that such goals not be less than the percentage of the total R&D funds awarded to small businesses in the preceding FY.

*Available in Committee files

The corresponding provisions of S. 881 would require, among other things, agencies to establish an SBIR program if after application of a prescribed formula, 1 percent of the amount available for obligation for research or research and development in the FY in question is equal to or exceeds $3,000,000. This formula is the product of the total amount available for obligation for research or research and development in the year for which the amount to be made available for an SBIR program is being determined and the percentage obtained by dividing the actual expenditures by the Agency for Research or Research and Development with the private sector (non-profit and for profit entities outside the Federal Government or conducted in or funded through Government-owned contractor operated facilities) for the most recent fiscal year for which data are available preceding the year for which the money to be made available (for an SBIR) is being determined, by the total expenditures for research or research and development for such fiscal year. The bill specifies that such an agency make available for the program not less than 20 percent of the 1 percent figure in the first FY, not less than 60 percent of such figure in the second FY, and not less than the 1 percent figure in all subsequent years. The Committee's intent in adopting this provision is stated in Senate Report 97-194 to accompany S. 881, "after full consideration, the Committee decided that 1 percent of agencies' R&D budgets, exempting in-house research, was an appropriate amount to fund the SBIR programs" and our assessment of the impact is based upon this statement.

In arithmetic terms, our understanding of the formula is expressed as:

$$\begin{array}{l} \text{FY 82} \\ \text{Approp} \end{array} \times \frac{\text{FY 81 Private Sector R\&D Expenditures}}{\text{FY 81 Total Agency R\&D Expenditures}} \times 1\% = \begin{array}{l} \text{Amount to be} \\ \text{set aside for} \\ \text{a FY 82 SBIR} \\ \text{Program} \end{array}$$

The funds so set-aside by the formula are to be reserved for the SBIR program and no other purpose; however, such funds are to be obligated consistent with the Agency's R&D mission.

S. 881 also specifies that any agency required to establish an SBIR program, but which had total R&D obligations of $2 billion or less in the preceding FY, shall make available for the program the total 1 percent figure. Both bills contain similar provisions regarding the unilateral establishment of goals for funding agreements with small businesses, except that the figure $100 million is substituted in S. 881 for the $20 million threshold contained in H.R. 4326. Both bills specify that all funding agreements with small businesses under an SBIR program shall be separate and distinct from other small business programs or goals referred to therein. Thus, each bill would create a new small business program of a different character from any existing small business programs and explicitly requires that the proposed SBIR program be over and above current small business program results included in other sections of the legislative proposals.

The legislative history, to date, of both bills makes it unmistakably clear that the SBIR program contained therein is to be an expansion of the National Science Foundation's present support, stimulation and assistance grant program to embrace all agencies throughout the Executive Branch engaged in research or research and development efforts. The effect of the H.R. 4326 would be to expand a current annual grant effort of some $5 million by the NSF to embrace some $1.195 billion of similar funding from other agency appropriations enacted thus far for a different purpose. Such intent is manifest in Report 97-349, Part 1, which states:

> "The bill defines the Small Business Innovation Research program and describes the program's three phases. For purposes of this bill, language describing the first phase of the SBIR program has been changed from requiring Phase 1 proposals to be evaluated according to 'technical and economic feasibility' to requiring that they be judged principally upon their 'scientific and technical merit.' Phase I is often too early to accurately evaluate economic feasibility in R&D efforts. Phase II, however, can introduce both technical and economic feasibility for government needs. Further the commercial potential of proposals is assessed effectively at the second phase through the follow-on funding commitment. The most scientifically and technically feasible proposals would be awarded small grants ($30,000-$50,000) in Phase I to fund a feasibility research or R&D effort. Those projects judged most promising in the first phase could then qualify for a second phase of funding (which currently ranges from $100,000-$500,000). Not only does the Federal government obtain the free use of any invention developed, but it also obtains tax revenue resulting from commercialization of any such patented invention by the R&D recipient. Commercialization of the results of the R&D would be left in most cases to the private sector under Phase III. The definition of the third phase was changed to clarify the Committee's intent that the funding of this phase not be required, but that proposals with commitments for follow-on private funding to pursue commercial applications receive extra

consideration in the evaluation process. The Committee also wanted to clarify its intent that follow-on production contracts may be competitively procured, and added language to this effect.

The bill does not authorize or require that any new federal money be authorized for these programs. Rather, 0.5 percent in the first fiscal year, 1 percent in the second fiscal year, 2 percent in the third fiscal year, and 3 percent in all subsequent fiscal years of each qualifying agency's R&D budget would be reallocated (reprogrammed) to fund the agency's SBIR program. The following chart sets out federal R&D expenditures estimated for fiscal year 1982 and the funding for each agency's SBIR program:

Agency	FY 1982 estimate of agency R&D obligations	SBIR funding (in millions)			
		0.5%	1%	2%	3%
DOD	$21,523	$107.62	$215.23	$430.46	$ 645.69
NASA	6,017	30.09	60.17	120.34	180.51
DOE	4,690	23.45	46.90	93.80	140.70
HHS	4,140	20.70	41.40	82.80	124.20
NSF	1,060	5.30	10.60	21.20	31.80
AGRICULTURE	860	4.30	8.60	17.20	25.80
TRANSPORTATION	398	1.99	3.98	7.96	11.94
EPA	303	1.52	3.03	6.06	9.09
COMMERCE	288	1.44	2.88	5.76	8.64
NRC	245	1.23	2.45	4.90	7.35
VA	159	.80	1.59	3.18	4.77
AID	151	.75	1.51	3.02	4.53
Total	$39,834	$199.19	$398.34	$796.68	$1,195.02

The Committee believes that a statutory allocation is essential if federal SBIR programs are to succeed. The Committee feels that there is ample flexibility in each agency's R&D budget to target the required percentage of their funds to implement the SBIR programs. It is left to the agencies' discretion to decide which funds to use for this purpose. However, the Committee expects agencies to exercise this discretion in a manner that will not result in significant disproportionate taxing of any component of the R&D budget. For example, concern has been expressed that basic research may, in some instances, be required to bear a greater share of the burden of funding SBIR programs. It is the Committee's intent that this not occur.

> In order to ensure that allocation of funds to SBIR programs does not lead to reduction in current levels of small business R&D funding agreements with the agency, the bill specifies that funding agreements with small business resulting from competitive or single-source selections other than under an SBIR program shall not be counted as meeting any portion of the percentage requirements set forth in the bill for overall agency R&D funding awards to small business."

How the foregoing is to be reconciled with the NASA 1982 Authorization and Appropriation Acts has yet to be determined.

The programmatic impact upon NASA of the set-aside provisions of these two bills is illustrated using FY 1980 figures in the following manner:

	H.R. 4326 (in thousands)	S. 881 (in thousands)
FY 80 R&D & R&PM Appropriations	$5,084,054	$5,084,054
NASA Institutional Costs (Salaries, travel, etc.)	996,000	996,000
Total R&D Awards to Private Sector (R&D and R&PM)	3,572,000	3,572,000
Less FY 80 Funding of Pre-existing Programs	2,789,000	2,789,000
Equals Private Sector Awards For New Requirements	783,000	783,000
Less FY 1980 Small Business R&D & R&PM Awards	301,146	301,146
Appropriated Funds Uncommitted to Pre-existing Programs and Current Level of Small Business	481,854	481,854
Maximum SBIR Set-Asides Required in Proposed Bills (Projected)	152,522	33,300

Percent of All Uncommitted Appropriated Funds Set Aside for SBIR Programs	31.6	6.8

The application of percentages to total appropriations without regard to the extent to which those appropriations are otherwise committed to the continuation of existing major programs (STS, Space Telescope, Landsat-D, STDN, Galileo, etc.) thus creates a major impact upon remaining available funds under H.R. 4326. The ability to maintain balanced agency programs under such circumstances is substantially inhibited. However, the application of the formula of S. 881 would not have the same inhibiting effect.

In addressing the manpower requirements for the conduct of an SBIR program, we have applied the requirements of H.R. 4326 and S. 881, as amplified in their legislative history, to the dollar magnitude of the program determined by each bill. Since the SBIR program to be established is to be patterned after that of the National Science Foundation, that agency's experience provides the primary relevant data for assessing potential workload.

Using the maximum 3% of NASA's R&D budget as a comparison, the FY 1981 NSF SBIR program is approximately 5.5% of the dollar magnitude that H.R. 4326 would legislate for NASA. The NSF conducts a single annual SBIR announcement; the House Small Business Committee contemplates two such annual announcements by NASA, both to be "coordinated" with the Small Business Administration. The House Committee on Small Business likewise envisions "peer group" review of all proposals, and "awards" biannually not later than 180 days from "proposal" receipt.

The NSF SBIR program from inception in 1977 through projected FY 82 results is as follows:

	1977	1979	1980	1981
Phase I Proposals	329	408	530	696
Phase I Awards	42	54	62	85
Phase II Awards	21	13	20-30 (Planned)	30-40 (Planned)
Avg Phase I Awards	25K	25K	25K	25K
Total Phase I Awards	1,050K	1,350K	1,550K	2,125K
Avg Phase II Awards	200K	200K	--	--

Total Phase II Awards	4,200K	2,600K	--	--
Total Program	5,250K	3,950K	--	--

On the basis of the NSF results to date, we have developed workload projections for a NASA SBIR program assuming:

> Phase I Awards - 6 months duration with an average value of $25,000 with approximately 25% of those awards resulting in Phase II awards.
>
> Phase II - 2 years duration with an average value of $200,000.
>
> House Small Business Committee estimates of NASA FY 1982 R&D obligations ($6,017B) carried as a constant for the 4 years required to achieve the full program percentage contained in H.R. 4326.

BASIS FOR DETERMINATION OF SET-ASIDE AMOUNT

YEAR	S. 881	H.R. 4326
1st	0.2% of formula result	0.5% of total R&D budget
2nd	0.6% of formula result	1% of total R&D budget
3rd	1% of formula result	2% of total R&D budget
4th	1% of formula result	3% of total R&D budget

The significant difference in the two bills is that under S. 881, the maximum percentage is 1% of an adjusted R&D base while under H.R. 4326, the maximum is 3% of the total R&D base.

Using the above assumptions and factors, their effect on NASA, under each bill, can be depicted as follows:

S. 881
($3,330,000,000 R&D Base)

		Phase I		Phase II		TOTAL	
Factor	FY	Awards	Dollars	Awards	Dollars	Awards	Dollars
.2%	82	280	7M	0	0	280	7M
.6%	83	240	6M	70	14M	310	20M
1%	84	840	21M	60	12M	900	33M
1%	85	0	0	165	33M	165	33M

H.R. 4326
($6,017,000,000 R&D Base)

		Phase I		Phase II		TOTAL	
Factor	FY	Awards	Dollars	Awards	Dollars	Awards	Dollars
.5%	82	1204	30.09M	0	0	1204	30.09M
1%	83	0	0	301	60.17M	301	60.17M
2%	84	4813	120.34M	0	0	4813	120.34M
3%	85	0	0	902	180.51M	902	180.51M

NOTE: The "zeros" appearing in both charts for FY 82 is based on the premise that required lead time will not be sufficient so as to permit any Phase II awards. The "zeros" appearing elsewhere in both charts are based on NSF experience to date and on the assumption that funds will be expended for pursuit of research considered to be both meritorious and fruitful.

To establish a SBIR program in NASA of the nature and magnitude in either bill may, of necessity, require creation of an organization separate and apart from existing procurement and technical elements. We envision the functions of such an organization to include: preparation of Phase I solicitations; receipt and review of responses thereto; and award and administration of resultant contracts. We envision Phase II activities to include: review of Phase I results to determine those projects which are most promising to proceed; and award and administration of resultant contracts. Functions which would cross both phases include those of an administrative nature such as coordination, statistical recording and report development.

It is our understanding that NSF has received between 600-700 proposals per solicitation under each Phase I program with an average annual total value of $2,500,000 and DOD received over 1,000 proposals under their initial Phase I program of $5,000,000. In each instance, approximately 10% of proposals for Phase I efforts result in awards. Using these statistics and the anticipated staffing to perform the above described program functions as a basis, our projection of manpower and other resources required to implement either bill is as follows:

	S. 881		H.R. 4326	
	Personnel (FTE)	Annual Cost $	Personnel (FTE)	Annual Cost $
Technical				
NASA HQ	8	290K	14	500K
NASA Fld Ctrs	10	360K	21	760K

Contractual (HQ & Fld Ctrs)	9	325K	16	550K
Data Systems		10K		30K
Miscellaneous		25K		50K
TOTAL	27	1,010K	51	1,890K

The above does not include any estimated costs associated with peer review. Objectivity would suggest review of proposals by several peers, an indeterminate number of whom would have to be obtained as consultants. The impact of such review on current consultant limitations is unknown and cannot be projected at this time.

NOTE: These figures differ from those presented to the Congressional Budget Office on November 17, 1981, primarily due to a more current data base.

As stated above, Part 1, Subpart 7, of the NASA Procurement Regulation covers the conduct of existing small business programs. It is difficult to assess how those procedures and practices would be modified to implement H.R. 4326 or S. 881 until such time as the "lead agency" designated under either bill promulgates the required policy directives for the general conduct of the SBIR programs. However, we are concerned that in both H.R. 4326 and S. 881, new procedures would be specifically developed for use by small businesses under the program, while at the same time those same small businesses, as well as all other businesses, would be using existing and apparently different procedures for procurements in the competitive marketplace. Furthermore, should the provisions of P.L. 95-224 pertaining to grants apply as in the NSF program, then a small business could conceivably be performing Government R&D programs using two entirely different sets of funding instruments with substantially different performance and funds accountability requirements.

In summary, based on the above analyses, it is clear that H.R. 4326, in its present form, would have an adverse impact on this agency's ability to accomplish its mission. On the other hand, we believe passage of S. 881 will serve the dual goals of increasing the small business share of research and development and benefiting the economy through increased competition and research incentives, and therefore support its passage.

The Office of Management and Budget advised that from the standpoint of the Administration's program, there is no objection to the submission of this report to the Congress.

Members of my staff and I are available at your convenience should further assistance be required.

Sincerely,

John F. Murphy
Director,
Office of Legislative Affairs

Enclosures

NATIONAL SCIENCE FOUNDATION
WASHINGTON D.C. 20550

nsf

OFFICE OF THE
DIRECTOR

January 21, 1982

RECEIVED
JAN 2[illegible] 1982
COMMITTEE ON SCIENCE
AND TECHNOLOGY

Honorable Don Fuqua
Chairman, Committee on Science
and Technology
House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

Thank you for the opportunity to present the views of the National Science Foundation on H.R. 4326, the Small Business Innovation Development Act, and on S. 881, which has passed the Senate with the support of the Administration. Although the two bills have parallel objectives, we prefer the means by which S. 881 would attain those objectives and will explain why in the paragraphs that follow.

NSF's major concerns with the provisions of H.R. 4326 are:

° a level of support that would be specified in law for the Small Business Innovation Research Program (SBIR), that may prove too high and lead to problems of scientific quality;

° the policy and monitoring roles specified for the Small Business Administration; and

° certain details of program design and proposal review.

Program Funding Levels, Potential Impacts, Testing of Quality

The NSF has serious reservations about the eventual level of 3% that would be reached under H.R. 4326. In the reports that accompany each of the bills, the Congressional Budget Office estimates the following set-aside totals for SBIR programs of the affected agencies:

CBO Estimates

Fiscal Year	Under S. 881	Under H.R. 4326
1982	$ 75 million	$ 200 million
1983	205	440
1984	355	955
1985	385	1,545
1986	415	1,665

These estimates compare with an estimated $10 million in FY 82--$5 million for SBIR by NSF and $5 million for the Defense Science and Technology (DESAT) program of the Department of Defense. Thus, even the smaller amounts of S. 881 would increase the presently allocated FY 82 figures by a factor of 7.5 in the first year, and by a factor over 41 in the fifth year. Under H.R. 4326, the funds for SBIR programs would start with a twentyfold increase in the first year increasing one hundred sixtyfold by the fifth year. We suggest that the very substantial rates of increase that S. 881 would provide are preferable to the even larger increases provided by H.R. 4326 for two principal reasons.

First, we are still learning how the program works. The 1% specified by S. 881 is high enough to provide a fair test of the concept. It is probably small enough to allow all parties to keep careful note of the quality of the science that is proposed for support and to permit funding based on careful review. Until the potential of the small business research community has been tested in terms of a steady flow of high quality proposals at the 1% level, it is risky to mandate an increase first to 2% and then to 3%. While there probably are enough research performing companies to absorb the funds that would be available at the 3% level, it is questionable that the quality of the research could be maintained. NSF experience shows that there is a much larger community of researchers in the universities who would seek and obtain funding if the standards were not so demanding. As it is, NSF rarely funds more than 50% of the proposals that it receives from the university community and individual programs fund far lower portions. Many of those it rejects are substantively very good. Any less demanding an approach for the small business innovation research program carries the risk of compromising quality.

Second, the increased flow of proposals even at the 1% level will cause a significant impact on the community of peer reviewers whose unpaid services are critical to the entire scientific endeavor. The initiation of several SBIR programs will generate many new applications from small companies. It is not expected that proposals from other researchers will decline. We should not assume that the reviewing community will continue to cooperate in the face of such an increase in the proposals to be reviewed.

This general concern that funding for SBIR funding government-wide not increase so rapidly as to jeopardize scientific quality also leads us to the conclusion that it makes sense to adopt the Senate's decision to calculate the percentage set-aside only on the basis of extramural research. The exclusion of intramural research (which, by the way, will not directly affect the

National Science Foundation) also permits a more realistic assessment of the impact of the required set-aside. It is unlikely that substantial amounts of research now done intramurally can be shifted to small business. As a result, any percentage set-aside calculated on an agency's intramural research would have to be met by setting aside a larger amount of the rest of the research budget. Many considerations enter into decisions to perform research in-house. These range from the time and expense it has taken to assemble and retain uniquely qualified special purpose research teams and facilities, the loss of focus and accountability problems that can result when certain research programs are fragmented and diffused, to specific congressional guidance requiring establishment of special purpose Federal facilities.

Policy and Monitoring

Although the two bills are broadly similar in the roles assigned to the Small Business Administration, the Office of Science and Technology Policy, and the Office of Federal Procurement Policy, there are differences that we consider significant.

H.R. 4326 provides that both SBA and OSTP independently survey and monitor the SBIR activities of the participating federal agencies. We see no need for such duplication. Because of its specific responsibilities for the balance of federal science programs, its scientific expertise, and its role as advisor to the President on science policy, we believe the OSTP better qualified to perform this task. SBA has neither the mandate nor the expertise to play a role in national science programs or policy.

Section 4(j) of H.R. 4326 provides that SBA, after consultation with other agencies, shall issue policy directives related to the SBIR programs of the mission agencies. Section 3(f) of S. 881 assigns a similar responsibility to the OFPP. We think the OMB/OFPP is the more appropriate for two reasons. First, the OMB's experience in implementing the Grant and Cooperative Agreements Act of 1977, and OFPP's efforts to simplify government procedures give OMB/OFPP a comparative advantage in drafting directives designed to simplify the SBIR process. Second, both because of the broader responsibilities and relationship to other units of the Executive Office of the President, the OMB/OFPP seems more likely to see the SBIR programs in the broader context of overall federal research programs.

Program Design

Peer Review: In comparing the provisions of the two bills in this general area, while S. 881 provides for outside peer review "as appropriate," (Section 3,(e)(3)(A)), H.R. 4326 appears to require outside peer review for at least Phase II proposals (Section 4, (j)(2)(B)). We prefer the greater flexibility of S. 881 since the imposition of unfamiliar research review methods may cause serious management problems for some agencies and possibly for small businesses as well. Policy guidance on standardization should minimize departures from the methods and procedures evolved by the various agencies to suit their organizational structures and research purposes. Particularly in a time of budgetary pressures and staff reductions, it is unrealistic to legislate steps likely to require staff expansion or increased administrative costs. It is important that the same quality controls that apply to an agency's usual research activities---whether or not these include peer review--apply to the SBIR as well. This increases the likelihood that grants and contracts for research with small business will become part of the agency's normal practice, thus alleviating the need for special set-asides or similar devices.

Budget Allocations for SBIR: In addition to its exclusion of intramural research, the Senate bill includes other provisions to assure that the impact of the required SBIR program falls equitably on other agency research. We thus endorse the intent behind the clause in section 3 (which would become part of Section 9(d)) to assure that neither basic research nor research in government-owned, contractor-operated facilities bears an undue share of the total SBIR set-aside. The NSF is particularly interested in encouraging the continuing vitality of basic research support by all appropriate Federal agencies. The National Science Board has long expressed its active concern for the strong support of basic research by the mission agencies. However, earlier this year, organizational distinctions between basic and applied research at NSF were eliminated and applied research functions, formerly located in a separate Directorate, were redistributed among all research Directorates. NSF research funds in its budget are not now separately earmarked as available for obligation for basic research, or for any other categories mentioned in the clause in Section 3. We do have a procedure to track actual research obligations according to whether they are in support of basic or applied. When final actions are taken on proposals and grant awards are made, program officials determine the basic/applied nature of the project, even assigning proportionate percentage figures where the research being supported is a mixture of both. Therefore, the clause will be difficult to apply to NSF. For forecasting purposes NSF probably will use the estimated distribution of funds provided to our Division of

Science Resources Studies for publication in Federal Funds for Research and Development.

Non-SBIR Small Business Goals

Both bills would require agencies to set small business targets apart from those required by the SBIR provisions. The NSF's experience, both before and since the establishment of its SBIR program, is that there have always been additional research awards to small businesses. In some recent years, these, together with SBIR, have totalled 1% of the NSF research budget. If the levels in S. 881 are enacted, the amounts allocated at NSF for SBIR will nearly double. It is expected that there would also continue to be a number of additional research awards to small companies each year outside the SBIR programs. However, we can visualize some circumstances in which an agency might find it advantageous to encourage utilization of research results by meeting its entire small business R and D goal through the SBIR program. We recommend that, so long as an agency meets at least its statutory minimum set-aside for SBIR projects, the legislation allow flexibility for meeting additional goals through additional SBIR projects or outside such a program format.

An additional point concerning non-SBIR small business goals is present in both bills. The bills appear to require that annual total small business R and D percentage goals for an agency be not less than the percentage of an agency's R and D awards to small business for R and D in the preceding fiscal year. The wording suggests that SBIR awards would be counted in establishing the floor for computation but could not be counted toward meeting the goals. This would appear to assure that the total small business goal for an agency will represent a larger proportion of the R and D budget each year. We find no rationale related to the scientific strength and progress of the Nation that would justify such statutory guarantees of unlimited incremental growth favoring one group of researchers. This problem could be remedied by specifically excluding SBIR awards from the computation of the small business goal for next year's non-SBIR small business awards. Alternatively, both types could be counted in establishing and fulfilling the goal. Either way would achieve consistency.

Long Term Program Evaluation

Given the experimental nature of the program, an independent evaluation is highly desirable. We endorse the provision of S. 881 that requires the Comptroller General to evaluate the longer term significance of the research conducted under the Act. However, two years following enactment is too soon since projects would not have completed Phase II at that point. Given the time required for scientific research results to be developed and assessed, NSF's experience indicates that such evaluation is much more useful and valid from about the fourth year onward. Further, we recommend that such evaluation include all research under the SBIR Act, not solely basic research as now provided in Section 3,(g). We find no rationale to exclude from evaluation any of the research supported through the SBIR programs. We suggest that agencies be required to retain copies of proposals received, the review record, and final reports for funded proposals so as to enable later program evaluation.

Summary Comment

H.R. 4326 differs in several aspects from S. 881 which was passed by the Senate. The National Science Foundation prefers S. 881 for the reasons discussed above.

We welcome the examination of these bills by the oversight committees of each of the major agencies affected by this legislation. Since the authorizing committees work with such care to guide and help develop the research and R and D programs of the agencies over which they have jurisdiction, it is important they review carefully and concur in any bill which would specify program structure, or reserve a portion of the program resources for designated research performers.

In the attached pages we discuss the several additional matters of interest to the Committee as enumerated in the fourth paragraph of your letter of November 30, 1981.

If further information or discussion would be useful,
Mr. Chairman, please let me know.

Sincerely,

Donald N. Langenberg
for John B. Slaughter
Director

copy to: Honorable Larry Winn, Jr.
Ranking Minority Member
Committee on Science and Technology

Attachment

Response to November 30, 1981 Inquiry from Chairman, Committee on Science and Technology, House of Representatives

Compliance with Applicable Statutes Relating to Small Business

PL 95-507, which amended the Small Business Act, provided in Section 211 for utilization of small businesses and small companies owned and controlled by socially and economically disadvantaged individuals. The law required that all federal agencies with procurement powers establish an Office of Small and Disadvantaged Business Utilization reporting directly to the Head or Deputy Head of that agency. NSF established such an office in March 1980. PL 95-507 is directed to procurement activities. Most NSF research support is provided through award actions that are not procurements, but the provisions of 95-507 affect a portion of NSF activities such as the agency's direct procurement of goods and services, and subcontracting under such prime contracts as those for operation of the National Centers. In compliance with the requirements of Section 221 of PL 95-507, NSF establishes goals for participation of small, and small and disadvantaged companies in the procurement actions placed directly by NSF. In addition, NSF requires goals for the subcontracting carried out by all NSF prime contractors funded at a level of $500,000 or more annually. PL 95-507 provides for the annual goals to be set after negotiations with the Small Business Administration, and calls for an annual report to the SBA on progress toward those goals.

Public Law 95-507 also requires that all purchases under $10,000 be reserved for small businesses unless responsive offers are not received from small firms. NSF procurement staff complies with these requirements.

Public Law 96-517 (Bayh-Dole), the Patent Rights Act of 1980, allows small business firms and nonprofit organizaions to retain the principal patent rights in federally-supported inventions. NSF is preparing new regulations, which will be issued shortly following the release of OMB implementing instructions.
The soon-to-be-issued Small Business Innovation Research program announcement is also consistent with the Bayh-Dole Act.

Public Law 96-354, the Regulatory Flexibility Act (RFA), and Executive Order 12291, require agencies to assure that existing and future regulations do not unduly hinder small entities. NSF does not routinely engage in such rulemaking activities. We do, nonetheless, publish the required agendas and notices of intent, and follow the spirit and intent of the RFA in preparing guidelines, solicitations, and the like, that could affect small entities.

Small Business Legislation Specific to NSF

The National Science Foundation Authorization Act for FY 1977, Public Law 95-471, required establishment of an Office of Small Business Research and Development. NSF made this a staff office of the Director and it is a focal point for communication between the Foundation and the small business research community. The office exercises a general oversight of small business activities within NSF, fosters communication between the small business community and the NSF, keeps the Director advised of relationships between the NSF and the small business community, and monitors compliance with statutory requirements that the Foundation must observe concerning small business. The Office makes no awards for research since these are made through the NSF research program units. In carrying out its responsibilities to foster communication, the Office has issued a Small Business Guide to Federal R&D to help small research companies deal more effectively with federal agencies, including NSF, in seeking possible opportunities for research support.

From FY 1976 through FY 1981, the authorization legislation for the NSF required that a specified percent of funds available for *applied* research be awarded to small companies. The percents varied from 7.5% in FY 76, to 10% in FY 77, to 12.5% from FY 78 through FY 1981. This was equivalent in some years to about one percent of the NSF budget. Those legislative provisions never specified the program structure or other steps by NSF for implementation. To help meet the target, NSF initiated its Small Business Innovation Research (SBIR) program in 1977 to stimulate quality proposals in NSF program areas. To reach high caliber small firms and to achieve other objectives, NSF designed a special three-phased program with incentives of particular interest to small science-based and high-technology firms.

Phase I supports research proposals of up to $30,000 for six months on important scientific or engineering problems or opportunities of interest to NSF. Those projects found most promising after phase I receive phase II awards which have averaged $200,000 for 1 - 2 years. This is the principal research project. Phase III is to pursue commercial applications where possible from the NSF research supported in phases I and II and is funded entirely with private capital.

Staff Assignments and Costs for Present SBIR Program

No additional staff were hired to conduct NSF's SBIR program. Until March 1981, the SBIR program was part of the NSF applied science programs. Since the 1981 reorganization, the program has been a part of the Division of Industrial Science and Technological Innovation, Directorate for Scientific, Technological, and International Affairs. The assignments of two professionals, a secretary and a student aide were changed to the SBIR program and this is the only staff devoting full-time to the program. The part-time participation of a large number of other staff throughout NSF is required also. We consider it unlikely that more than 10% of any other individual's time is required for SBIR activities outside of the immediate program staff.

The solicitation is designed to enable efficient handling of the large number of proposals received. The format is standardized. Phase I proposals are limited to 20 pages.

Some 20-25 topics are included in the solicitation, each of which has a separate NSF program manager so that the workload is distributed within NSF. These program managers are specialists in their topic areas and handle the SBIR proposals as part of their regular responsibilities. Each one writes his or her own research topic, receives the proposals submitted under that topic, recommends reviewers, evaluates the reviews received and recommends award or declination of the proposal. The SBIR staff processes each proposal, screening each phase I proposal to ensure that only those meeting the requirements of the solicitation are accepted for review, secures three outside peer reviews for each phase I proposal, and generally coordinates and manages the program.

Some 700 proposals were received in our 1981 solicitation. These resulted in 85 phase I awards. Since only phase I grantees can submit phase II proposals, the number of standard length phase II proposals is sharply reduced from the initial 700 to an estimated 70-80, distributed to 20-25 members of the NSF professional staff. This normally results in 25-35 Phase II awards.

Since phase II proposals are fewer in number but seek substantial dollar support, the standard NSF practice of 5 to 7 reviewers is followed. Peer reviewers are from universities and government laboratories who conduct the reviews at no cost to the program. Following the reviews, panels are convened in some topical areas, and NSF pays the standard $100 a day consulting fee plus travel costs for these.

Other staff involved in the program include those in other offices normally involved in NSF awards. Direct program costs include an estimated $60,000 for printing, mailing and panel expenses.

Related program costs include an estimated $300,000 for studies improving our understanding of the contribution of small firms in advancing science and industrial innovation, and for assessments of factors affecting that contribution, and for conferences designed to increase the effectiveness of the NSF SBIR program.

Future Personnel Estimates

At this time, NSF estimates that if S. 881 is enacted in its present form, this agency would implement the program initially with no additional personnel. Should H.R. 4326 be enacted, it is possible that at the higher percents and higher volume of proposals there would be some need for additional staff to be assigned to small business activities, particularly in areas related to the processing of awards after scientific decisions have been made. In a considerable number of cases involving small firms, it is necessary for agency staff to work with prospective awardees to assure that their financial management systems enable accounting for government funds. Should such increases in staff assignments be necessitated, it would appear at this writing to coincide with fewer available personnel due to reductions that are a part of the President's economic recovery program. There are more than the normal uncertainties involved in attempting at this time to forecast the personnel requirements.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CHAIRMAN

January 21, 1982

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COMMITTEE ON SCIENCE
AND TECHNOLOGY

The Honorable Don Fuqua, Chairman
Committee on Science and Technology
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

I am writing in response to your letter of November 30, 1981 requesting the Nuclear Regulatory Commission's views and comments on H.R. 4326, the Small Business Innovation Development Act, and the Senate counterpart, S. 881. The differences between H.R. 4326 and S. 881 as they impact NRC's research program are minimal. As explained below, the Commission is concerned with the provision in both bills imposing percentage expenditure requirements for a set-aside for small business.

The NRC is charged with the assurance of public health and safety, common defense and security, and environmental quality from hazards associated with the use of nuclear materials. In carrying out its responsibilities, NRC conducts research in amounts of about 200 million dollars per year. The research program is conducted for the purpose of furthering nuclear safety as prescribed by the Energy Reorganization Act of 1974, as amended. Thus, the enabling legislation of the NRC channels the research program in a narrow, highly technical area of nuclear research. Consequently, those firms willing and able to conduct research of the type required by the NRC are extremely limited in number. Due to the nature of the work, the major capability to conduct such research within the United States is at U.S. Government-owned Federal research centers ("National Laboratories"). Some capability other than the Federal centers does exist; however, that research is almost totally conducted by the regulated industry.

The NRC has conducted an aggressive campaign to interest and support small and disadvantaged businesses in the research program of the NRC. Unfortunately, most of these firms find that the technical expertise required, capital cost of equipment and limited application are not conducive to a reasonable business investment. Even with this aggressive program, the total research dollars awarded to small businesses in FY81 is less than 1/2 of one percent (.45%). This is attributable to the lack of a small business market for conducting nuclear research.

Enactment of the subject bills would require the NRC to contract for research which would be unnecessary, and possibly for activities not authorized by the NRC's enabling legislation, in order to meet the imposed budget expenditure. This is inconsistent with the purpose of the 1974 ERA authorizing research "for technological innovation to meet agency needs." The intent and purpose of the Small Business Innovation Development Act could be achieved by establishing agency goals under which agencies would be provided incentives to support the SBIDA program while precluding the purchase of irrelevant research. We can and would support such a program in lieu of the present bills' required percentage budget expenditures.

If H.R. 4326 or S. 881 were adopted, we anticipate that no additional staff would be required to implement the Act. Contracts with commercial sources currently amount to approximately $20 million/year (10 percent of the research budget), and it is expected that any funds used to implement the proposed act would come from this part of the research budget. We therefore expect that there would be an even trade-off of staff time from present assignments to the implementation of the proposed act.

The NRC supports the intent and purpose of Congress to strengthen the growth of the nation's economy through support of small business. However, the type and nature of research conducted by the NRC is not conducive to furthering the objectives of H.R. 4326 and S. 881.

Sincerely,

Nunzio J Palladino

Nunzio J. Palladino

cc: Rep. Larry Winn, Jr.

Office of the
Administrator
of Veterans Affairs

Washington, D.C. 20420

Veterans
Administration

January 22, 1982

Honorable Don Fuqua
Chairman, Committee on
Science and Technology
House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

I am pleased to respond to your November 30, 1981, request for the views of the Veterans Administration on H. R. 4326, 97th Congress, the "Small Business Innovation Development Act of 1981." The VA supports enactment of the Senate passed counterpart, S. 881. However, for the following reasons, the VA opposes the enactment of H. R. 4326.

The proposed bill would require agencies having research and development budgets in excess of $100 million a year to establish a small business innovation research (SBIR) program to enable small firms to develop new products and processes. A fixed percentage of an agency's research and development budget, totaling not less than three percent by FY 1985 and thereafter, would be required to be expended for this purpose. Any agency with a research and development budget exceeding $20 million also must establish goals to set-aside a portion of its contracts for award to small businesses.

As in the past, the VA supports efforts which assist small businesses to obtain Government contracts. However, this bill presupposes that research and development projects are accomplished primarily by contract. The VA conducts the preponderance of its research and development projects in-house utilizing its own staff, with only a small percentage of the total VA research and development budget available for contract award. Approximately 80 percent of VA researchers are VA staff who are primarily responsible for patient care. The establishment of a dollar goal as proposed in subsection 4(f) would artificially inflate the goal applicable to the VA, resulting in a greater percentage of the VA's research and development budget than is actually available for contracting purposes.

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COMMITTEE ON SCIENCE
AND TECHNOLOGY

Since most VA research and development projects are conducted in-house, the Senate bill, S. 881, would not significantly affect the VA research program since the Senate formula exempts in-house research. For this Agency, the Senate bill merely would require the research and development program to establish set-aside goals for small businesses that would continue existing levels of contracting with small business concerns. Additional goals would not be required until total research and development expenditures reached a total of $300 million in a fiscal year.

In accordance with Agency procedures, a decision by the VA to pursue a research and development project is made on the basis of a merit process which each research proposal must undergo prior to approval. I believe, however, that applying an outside influence, such as the mandatory extramural peer review called for in H. R. 4326, may have a detrimental effect on the VA's research and development program.

In response to your specific questions, enactment of H. R. 4326 would not impose a significant additional administrative burden in terms of personnel, time or budget on the VA. The VA already maintains a specialized staff to foster small business programs for the development of plans to increase contract awards, including contracts for research and development, to small businesses for the development of small business source lists; and for the establishment of small business set-aside goals in conjunction with the Small Business Administration. In FY 1982, for example, the VA has established a goal to award contracts totaling 49 percent of total procurements to small businesses.

The VA's procurement practices and policies which are embodied in its regulations, of course, would be modified to reflect the provisions of H. R. 4326 and S. 881, if enacted. These provisions also would be incorporated into the VA's already functioning small business program.

We are advised by the Office of Management and Budget that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely,

Robert P. Nimmo

ROBERT P. NIMMO
Administrator